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A special course designed to meet the needs of students who enter high school with achievement in mathematics below the sixth-grade level is presented. After completion, the students will be qualified to take the essential mathematics course designed for students who are not planning to enter college.

The basic concepts, understandings, and skills of arithmetic will be taught, including a thorough review of the place system of decimal notation and a thorough mastery of the basic facts. Units covered are fractions, decimals, percent, practical applications of mathematics, and units of measurement. Each unit contains an introduction for the teacher and problems for the students. A bibliography is also included.

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BASIC MATHEMATICS II

FOR THE
SECONDARY SCHOOLS

BENJAMIN C. WILLIS
General Superintendent of Schools

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BASIC MATHEMATICS II

FOR THE
SECONDARY SCHOOLS

BENJAMIN C. WILLIS
General Superintendent of Schools

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Policy decisions regarding the content and placement of materials were recommended by the committee. Special credit for preparing this tentative program in Basic Mathematics II is due to Mr. Charles T. McCarthy, Mathematics Department, Hyde Park High School.

FOREWORD

During the past half century the per cent of boys and girls of high school age sho have entered high school has tremendously increased. This has resulted in necessary curricular changes from time to time to provide for wider ranges in abilities, needs, and interests of students at the high school level.

To meet the needs of the changing high school population, a number of curricular changes have been made over the years. For example, a four-semester course in Essential Mathematics was developed about twenty years ago for students who were not planning to enter college and who needed more training in mathematics to meet the problems of daily living. This course was prepared primarily for students who entered high school with sixth-and seventh-grade achievement in arithmetic.

As the per cent of the 14 to 17 year age group that enters high school approaches the 100% mark, the range in abilities of students is so wide that some students now enter high school with such serious deficiencies in arithmetic that they cannot profit to any extent, at least at the time of entering high school, from a study of Essential Mathematics. For some time, mathematics teachers have felt that a special course should be developed for students who enter high school with achievement in mathematics below the sixth-grade level. This course in *Basic Mathematics* is designed to meet the needs of these students. It is designed as a two-semester course with the expectation that those who complete it will have achieved sixth-grade competency and will then be qualified to take the Essential Mathematics courses.

The committee which prepared the outline for this course is of the opinion that two principal causes of serious deficiencies in arithmetic are a lack of understanding of the decimal system of notation and a lack of knowledge of the basic facts of addition, subtraction, multiplication, and division in this system. *Basic Mathematics* is designed to develop the basic concepts, understandings, and skills of arithmetic beginning with a thorough review of the place system of decimal notation and through a thorough mastery of the basic facts.

Without this firm foundation further practice in the fundamental operations with whole numbers, common fractions and decimal fractions, and per cents seems to be of little value. It is the aim of *Basic Mathematics* to develop foundation concepts, skills, and understandings of arithmetic through experiences which are pertinent to the interests of the chronological ages of students who will take the course.

Since textbook materials of this nature have not as yet been developed, it is the hope of the committee that teachers will give the experimental materials in the units of *Basic Mathematics II* a thorough test in the classroom and report their reactions both pro and con to the Bureau of Curriculum Development so that any necessary revisions may be made. It will be appreciated if these reactions are sent at the completion of each unit rather than at the end of the course.

BENJAMIN C. WILLIS

General Superintendent of Schools

BASIC MATHEMATICS PROGRAM

Any study of the trend of school populations will indicate that high school enrollments will continue to increase for the next several years. This increase in the number of students in high schools coupled with world-wide emphasis on mathematics and science will lead more and more pupils into mathematics classes. Not all of these young people will be able to do the work of the regular high school mathematics curriculum.

Our Chicago High School population represents a wide range in ability. So that all of our high school students may have the opportunity of being enrolled in courses best suited to their abilities our committee was concerned with developing a course to meet the needs of the mathematically weak student. We feel such a course is essential. With a cosmopolitan school enrollment such as Chicago has, some pupils are poor achievers because of conditions over which they have no control. Some of the more common reasons for their weaknesses in mathematics are:

1. Lack of educational opportunities prior to enrollment in Chicago schools
2. Transiency - local and regional
3. Lack of native ability
4. Lack of interest

This course of study in Basic Mathematics is designed to meet the needs of pupils entering high school with achievement in arithmetic below sixth-grade level. It is set up as a two-semester course in the expectation that those who complete it will have achieved sixth grade competency and will be qualified to take Essential Mathematics.

If a high school program in Basic Mathematics for those achieving below sixth-grade level in mathematics is to result in functional competence in simple arithmetic understandings and processes it must contain those elements which will motivate slow learners to desire self-improvement. To initiate this self-directive instruction we suggest:

1. Class memberships: restricted in number
2. Attractive classrooms
3. Adequate work materials and texts
4. A multiplicity of sensory and manipulative devices
5. Interested, enthusiastic, and skilled teachers

The Committee

OBJECTIVES OF BASIC MATHEMATICS

1. To develop an understanding of the decimal system of notation

2. To develop an insight into and a mastery of the basic addition, subtraction, multiplication, and division facts

3. To develop a clear connection between this information and its use in life situations

4. To develop an attitude of good workmanship, accuracy, and adequate speed through an understanding of mathematical skills and concepts

5. To develop the ability to estimate an answer with reasonable accuracy

6. To develop the ability to use appropriate mathematical equipment

7. To develop sufficient understanding and competency to be able to profit from instruction in Essential Mathematics

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BASIC MATHEMATICS II

UNIT I

FRACTIONS

A. Developing the Fraction Concept

(SUGGESTIONS FOR TEACHING ASSIGNMENT 1)

The student in Basic Mathematics should deal almost exclusively with those fractions which are used in socially significant situations. **Research studies show** that a high per cent of all of the fractions used in practical situations have denominators of 2, 3, 4, 5, 6, 8, 10, 12, and 16. Other numbers, however, do occur as denominators of fractions which are used to a certain extent in social situations. For example, in measurement problems thirty-seconds of an inch is not uncommon. Also, in expressing the ratio of two quantities in fractional form most any number might be in the denominator. If a team has played 13 games and won 7 of them, the fraction 7/13 represents the part of the games which the team has won. For most of the problems in this unit, however, we will restrict the work to fractions having denominators which are most commonly used in daily living.

A fraction may convey any one of the following meanings:

(1) A part of a whole (5/8")

(2) A part of a group (3 is 1/2 of 6)

(3) The ratio of two quantities (the ratio of 5 to 10 is 5/10 or 1/2)

(4) An indicated division ($7/3 = 3\overline{)7} = 2\text{-}1/3$

For the students in Basic Mathematics the first two meanings should be taught. The teacher must be certain that the class does not begin work with the four fundamental operations with fractions until the pupils understand the meaning of fractions.

Manipulative aids are effective in a program which emphasizes meaningful learning. The following materials are useful for giving a fraction meaning.

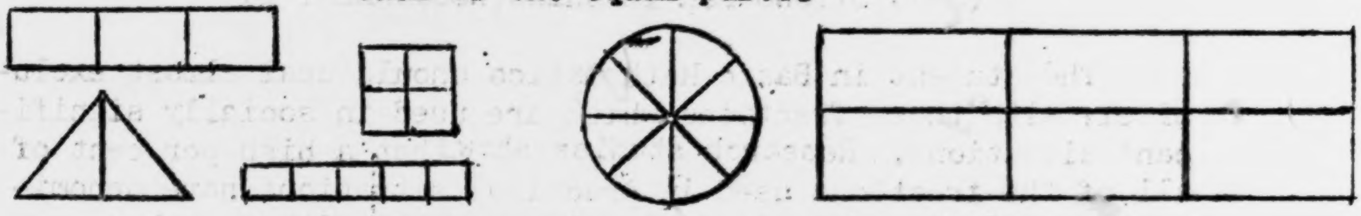
1. Objects which can be cut into fractional parts (apples, candy bars, notebook paper)
2. Measuring cup graduated to show halves, quarters, etc.
3. Ribbon or string which can be cut into or folded into equal pieces or parts.

BLANK PAGE

There are three steps in representing a fraction as part of a whole.

1. Identification of fractional parts:

   Place on the blackboard diagrams such as those given below and call on students to come to the board and write on the diagram the value of each of the equal parts.

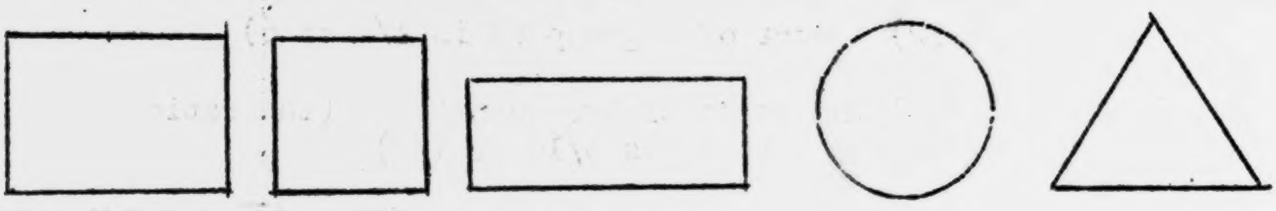


   The student can fill in 2/3, 3/5, and 5/6 of some of the figures.

   Have the students tear a piece of notebook paper in half and then each half in half. Mark each of the four parts as $\frac{1}{4}$ of the whole. Find as many other examples as you can to emphasize identification of fractional parts.

2. Reproduction of a fraction:

   Again place diagrams on the board and in this case have the students divide the figures into a given fractional part of a whole. Instruct the students to divide the figures into halves, thirds, fourths, etc.



3. Comparing fractions:

   The final step in developing the meaning of a fraction as a part of a whole consists in comparing fractions. Draw a chart on the blackboard similar to the one below.

<table>
<tr><td colspan="24">1 whole</td></tr>
<tr><td colspan="12">1/2</td><td colspan="12">1/2</td></tr>
<tr><td colspan="6">1/4</td><td colspan="6">1/4</td><td colspan="6">1/4</td><td colspan="6">1/4</td></tr>
<tr><td colspan="3">1/8</td><td colspan="3">1/8</td><td colspan="3">1/8</td><td colspan="3">1/8</td><td colspan="3">1/8</td><td colspan="3">1/8</td><td colspan="3">1/8</td><td colspan="3">1/8</td></tr>
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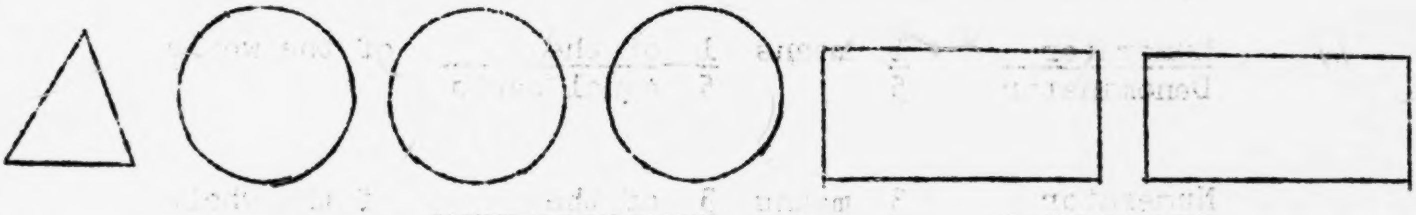
</table>

Using this chart, ask the following questions:

1. In one whole, how many halves, thirds, fourths, etc., are there?
2. How many fourths in 3/4?
3. How many eighths in 5/8?
4. How many sixths in 1/2?
5. Which is greater, 1/4 or 1/6?
6. Which is greater, 1/3 or 1/8?
7. Which is greater, 3/4 or 5/8?

How many questions of this sort need to be asked depends on the group. Do enough of these so that the student is capable of making these comparisons.

The second meaning of fraction the students should understand is that it can indicate one or more equal parts of a group. Use the following example to bring out the meaning:



1. How many figures are there? (6)
2. How many triangles are there? (1)
3. The triangle is what part of the whole group (1/6)
4. How many circles are there? (3)
5. The circles are what part of the whole group? (3/6)
6. How many rectangles are there? (2)
7. The rectangles are what part of the whole group? (2/6)

As the students answer questions 3, 5, and 7, be sure they understand the idea that the fraction indicates what part that particular figure is of the whole group.

B. Parts of a Fraction

(SUGGESTIONS FOR TEACHING ASSIGNMENT 2)

Arithmetic uses many technical expressions which the student must understand. In fractions the following terms should be understood by the student: numerator, denominator, proper fraction, improper fraction and mixed number.

A real understanding of the meaning of the numerator and denominator of a fraction will reduce the number of errors later in the fundamental operations. Mistakes such as this: $1/3 + 1/4 = 2/7$ indicate a lack of understanding of the meaning of the denominator of a fraction.

A fraction is one or more of the equal parts that make a whole. The denominator gives the size of the part and the numerator gives the number of parts. As an example:

$$\frac{3}{4} \quad \begin{array}{l}\text{number of parts}\\ \text{size of the parts}\end{array}$$

The numerator is the "numberer" of the parts and the denominator is the "namer" of the parts by size. Put several examples such as the following on the blackboard:

$\frac{\text{Numerator}}{\text{Denominator}}$ $\frac{1}{5}$ means $\frac{1 \text{ of the}}{5 \text{ equal parts}}$ of the whole

$\frac{\text{Numerator}}{\text{Denominator}}$ $\frac{3}{8}$ means $\frac{3 \text{ of the}}{8 \text{ equal parts}}$ of the whole

You can state that the denominator is the unit into which you have divided the whole thing. As illustrations of this point:

Item	Unit
7 inches	inches
13 yards	yards
5 miles	miles
2 thirds	thirds
3 eighths	eighths
1/4	fourths
4/7	sevenths

A visual representation of this idea can be performed as follows: Have each student divide sheets of notebook paper into halves, thirds, and eighths. Label each part. Then have the students hold up 1/2, 1/3, 2/3, 1/8, 2/8, 3/8, etc. Students will look for pieces of the correct size (the denominator) and then will hold up the number of pieces needed (the numerator).

C. Properties of Fractions

(SUGGESTIONS FOR TEACHING ASSIGNMENT 3)

There are two basic principles of fractions which the students must understand clearly before continuing on in fractions. These two principles are:

1. Both the numerator and denominator of a fraction may be multiplied by the same number without changing the value of the fraction.

2. Both the numerator and denominator of a fraction may be divided by the same number without changing the value of the fraction.

The first principle enables us to convert to a common denominator and the second to reduce fractions to their lowest terms.

To explain these two principles, refer again to the fraction charts:

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<tr><td colspan="8">1 whole</td></tr>
<tr><td colspan="4">1/2</td><td colspan="4">1/2</td></tr>
<tr><td colspan="2">1/4</td><td colspan="2">1/4</td><td colspan="2">1/4</td><td colspan="2">1/4</td></tr>
<tr><td>1/8</td><td>1/8</td><td>1/8</td><td>1/8</td><td>1/8</td><td>1/8</td><td>1/8</td><td>1/8</td></tr>
</table>

<table>
<tr><td colspan="12">1 whole</td></tr>
<tr><td colspan="4">1/3</td><td colspan="4">1/3</td><td colspan="4">1/3</td></tr>
<tr><td colspan="2">1/6</td><td colspan="2">1/6</td><td colspan="2">1/6</td><td colspan="2">1/6</td><td colspan="2">1/6</td><td colspan="2">1/6</td></tr>
<tr><td>1/12</td><td>1/12</td><td>1/12</td><td>1/12</td><td>1/12</td><td>1/12</td><td>1/12</td><td>1/12</td><td>1/12</td><td>1/12</td><td>1/12</td><td>1/12</td></tr>
</table>

From the first chart have the student fill in the missing numbers in each example:

$$\frac{1}{2} = \frac{\_}{4}; \quad \frac{1}{4} = \frac{\_}{8}; \quad \frac{1}{2} = \frac{\_}{8}; \quad \frac{2}{4} = \frac{\_}{8}; \quad \frac{3}{4} = \frac{\_}{8};$$

From the second chart:

$$\frac{1}{3} = \frac{\_}{6}; \quad \frac{1}{3} = \frac{\_\_}{12}; \quad \frac{1}{6} = \frac{\_\_}{12}; \quad \frac{2}{3} = \frac{\_}{6}; \quad \frac{2}{3} = \frac{\_\_}{12}; \quad \frac{4}{6} = \frac{\_\_}{12}$$

After having obtained the answers to these eleven problems, take several of them and show that the missing numbers can be obtained without using the chart. As examples:

$$\frac{1 \times 2}{2 \times 2} = \frac{2}{4}; \quad \frac{3 \times 2}{4 \times 2} = \frac{6}{8}; \quad \frac{1 \times 4}{3 \times 4} = \frac{4}{12}; \quad \frac{4 \times 2}{6 \times 2} = \frac{8}{12}$$

Remind the students that the answers were obtained originally from the chart and that the principle of multiplying the numerator and denominator by the same number is a short, quick way of obtaining the same answers.

To explain the second principle, reverse the procedure and start with larger parts and obtain the smaller parts. From the charts above have the students fill in the missing numbers:

$\frac{2}{4} = \frac{\_}{2}$; $\frac{2}{8} = \frac{\_}{4}$; $\frac{4}{8} = \frac{\_}{2}$; $\frac{4}{8} = \frac{\_}{4}$; $\frac{6}{8} = \frac{\_}{4}$; $\frac{2}{6} = \frac{\_}{3}$;

$\frac{4}{12} = \frac{\_}{3}$; $\frac{2}{12} = \frac{\_}{6}$; $\frac{4}{6} = \frac{\_}{3}$; $\frac{8}{12} = \frac{\_}{3}$; $\frac{8}{12} = \frac{\_}{6}$

Again take several examples from this group and show that the answers can be obtained by dividing the numerator and denominator by the same number.

$$\frac{2 \div 2}{4 \div 2} = \frac{1}{2} \qquad \frac{4 \div 4}{8 \div 4} = \frac{1}{2} \qquad \frac{6 \div 2}{8 \div 2} = \frac{3}{4}$$

$$\frac{4 \div 4}{12 \div 4} = \frac{1}{3} \qquad \frac{2 \div 2}{12 \div 2} = \frac{1}{6} \qquad \frac{8 \div 4}{12 \div 4} = \frac{2}{3}$$

We put this second principle to work immediately in the process of reducing fractions to their lowest terms. To reduce a fraction to its lowest terms you divide the numerator and denominator of the fraction by the same number. Emphasize that in reducing fractions to lowest terms:

1. Fewer parts are found but the parts are larger
2. You are changing the form of the fraction but not the value.

It is questionable whether a teacher is always justified in marking a problem wrong when the answer has not been reduced to its lowest terms, but to get the student to reduce his answers the best policy is to mark them wrong if they do not do so.

In many problems there is a long way and a short way of reducing to lowest terms: As an example:

Long way: $\frac{8}{12} = \frac{8 \div 2}{12 \div 2} = \frac{4}{6} \qquad \frac{4 \div 2}{6 \div 2} = \frac{2}{3}$

Short way: $\frac{8}{12} = \frac{8 \div 4}{12 \div 4} = \frac{2}{3}$

The student should not be criticized for doing the problem the long way but he should be encouraged to try to think of the largest divisor possible.

It is well at this time to emphasize that reducing a fraction to its lowest terms is part of doing the problem and is not part of the directions.

D. Types of Fractions

(SUGGESTIONS FOR TEACHING ASSIGNMENT 4)

The student should master the types of fractions and the forms that fractions take. The pupil should be able to identify proper fractions, improper fractions, and mixed numbers from a list of numbers such as:

$$\frac{5}{3} \quad \frac{6}{8} \quad \frac{7}{7} \quad \frac{2}{3} \quad \frac{15}{8}$$

Develop the idea that a fraction represents less than a whole, that a fraction has a value less than 1, and that when the fraction represents a whole, it is written as a whole and not as a fraction. We label as proper anything that fits the definition of that thing. We say that a person acts properly or dresses properly. In fractions also we say that fractions such as

$$\frac{2}{3} \quad \frac{5}{8} \quad \frac{7}{13} \quad \frac{11}{12}$$

are proper fractions. They fit the definition of a fraction. In a proper fraction observe that:

1. The value is less than 1.
2. The numerator is less than the denominator.

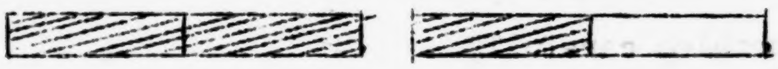
We label as improper fractions such as

$$\frac{8}{6} \quad \frac{9}{4} \quad \frac{12}{9} \quad \frac{7}{7} \quad \frac{2}{2}$$

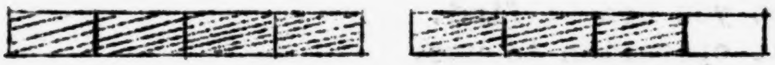
We use the name improper because they do not fit the definition of a fraction (part of a whole thing). They represent the whole thing $(\frac{7}{7}, \frac{2}{2})$ or more than the whole thing $(\frac{8}{6}, \frac{9}{4}, \frac{12}{9})$.

The name mixed number comes from the idea that it is a combination of a whole number and a fraction combined together.

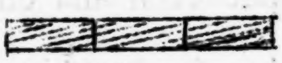
Use manipulative and visual materials to illustrate the meaning of the improper fraction and its relation to a mixed number. Put drawings on the blackboard to illustrate this point. Show that there are two ways to write the same thing:



$\frac{3}{2} = 1\frac{1}{2}$



$\frac{7}{4} = 1\frac{3}{4}$



$\frac{3}{3} = 1$

Have the students make drawings to illustrate each of the following:

$$\frac{5}{4} = 1\frac{1}{4} \quad \frac{5}{3} = 1\frac{2}{3} \quad \frac{11}{6} = 1\frac{5}{6} \quad \frac{2}{2} = 1 \quad \frac{5}{5} = 1$$

Observe the following with respect to improper fractions and mixed numbers:

1. An improper fraction is equal to or greater than 1 whole.

2. An improper fraction has a numerator equal to or greater than the denominator.

3. A mixed number is greater than 1 whole.

After the student has made drawings to illustrate the relationship between mixed numbers and improper fractions, show that it is possible to obtain these answers by dividing the numerator by the denominator. Use these examples:

$$\frac{3}{2} = 1\frac{1}{2} \qquad \begin{array}{r} 1\frac{1}{2} \\ 2\overline{)3} \\ \underline{2} \\ 1 \end{array} \qquad \frac{7}{4} = 1\frac{3}{4} \qquad \begin{array}{r} 1\frac{3}{4} \\ 4\overline{)7} \\ \underline{4} \\ 3 \end{array} \qquad \frac{3}{3} = 1 \qquad \begin{array}{r} 1 \\ 3\overline{)3} \\ \underline{3} \end{array}$$

In some cases the fractional part of the mixed number must be reduced to lowest terms.

$$\frac{6}{4} = 1\frac{2}{4} = 1\frac{1}{2} \qquad \frac{8}{6} = 1\frac{2}{6} = 1\frac{1}{3}$$

The common error made in these problems is to leave off the whole number in the last step:

$$\frac{6}{4} = 1\frac{2}{4} = \frac{1}{2}$$

To avoid this error emphasize to the students the importance of the equal sign and the fact that the numbers are not equal unless the 1 is repeated.

All of the work in Assignment 4 is important in that the answers obtained in the four fundamental operations must be simplified according to these procedures.

E. Review of Word Problems

(SUGGESTIONS FOR TEACHING ASSIGNMENT 5)

A great deal of time was spent in Basic Mathematics I on the solution of word problems. It is well to review at this time some of the important ideas in solving word problems:

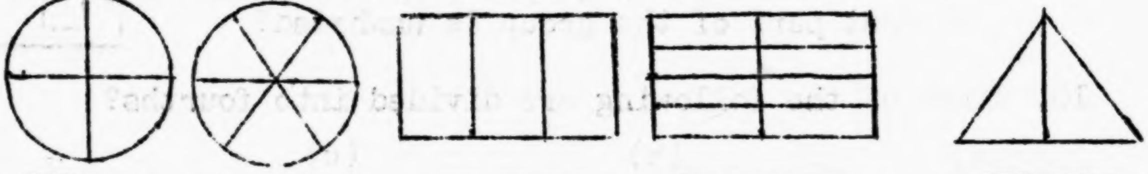
1. Read the problem carefully.
2. Decide what facts are given.
3. Decide what you are to find.
4. Decide what operation to use.
5. Do the computation and check.

As each operation in fractions is completed, word problems involving the operation will be presented.

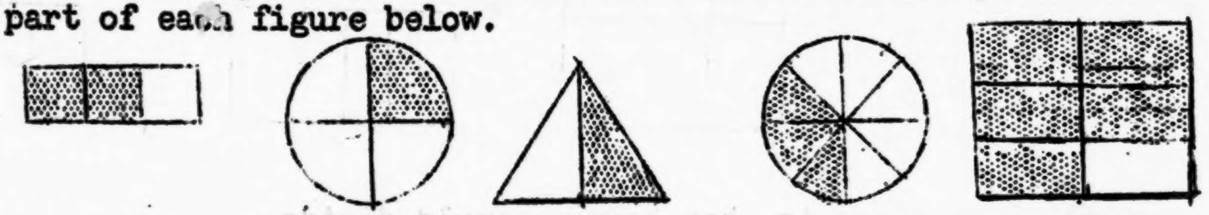
Assignment 5 is intended to review some of the word problems from Basic Mathematics I.

ASSIGNMENT 1

1. Below each figure write the fraction that tells what part of the whole one piece is.



2. Write in figures and in words the fraction shown by the shaded part of each figure below.

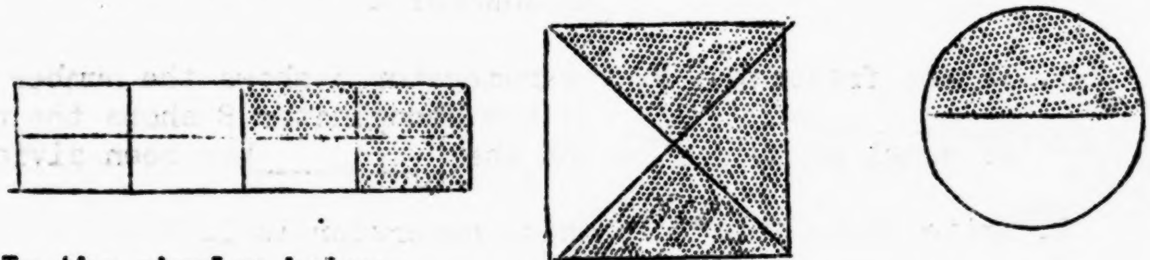


3. Write in figures the fraction that indicates what the unshaded part is of each figure in Problem 2.

4. If you served an apple pie to 6 people, what part of the pie would each person receive?

5. In the fraction 2/3, the numerator 2 is the ________of parts and the denominator 3 is the ________of the parts.

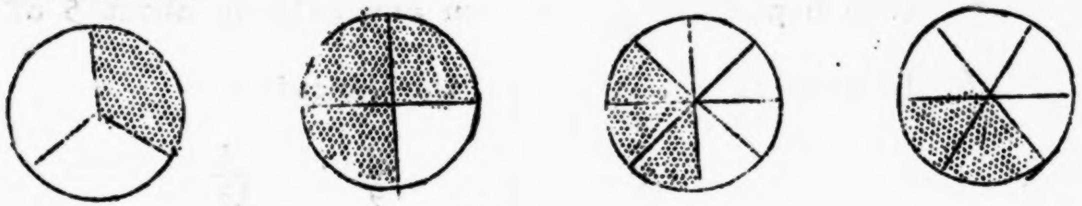
6. What part of each figure has been shaded?



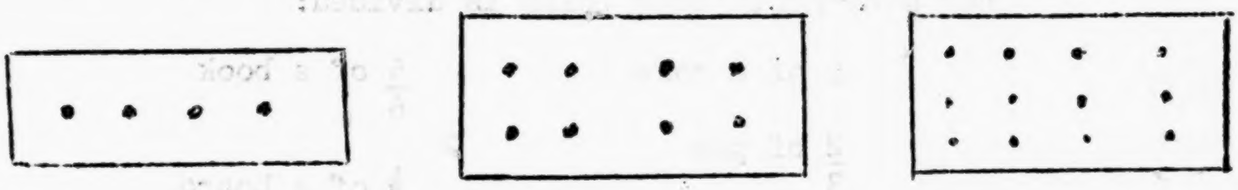
7. In the circles below:

   a. Write the fraction that tells what part of the circle is shaded.

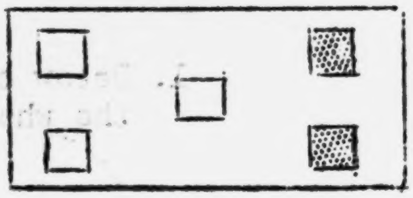
   b. Write the fraction that tells what part of the circle is not shaded.



8. Draw a ring around 1/2 the dots in each box below:



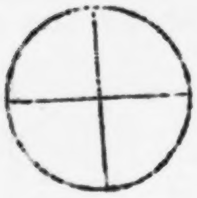
9. Using the figure at the right:



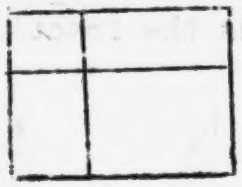
   a. How many figures are in the box?
   b. What part of the group is shaded?
   c. What part of the group is unshaded?

10. Which of the following are divided into fourths?

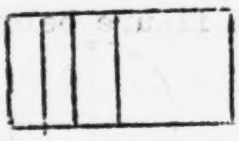
(a)



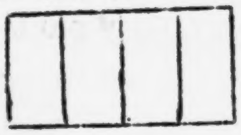
(b)



(c)



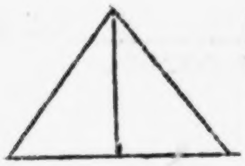
(d)



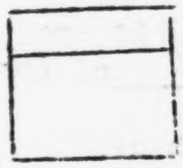
11. Draw lines to show how you would divide the candy bar at the right equally among three boys.

12. Which of the following are divided into halves?

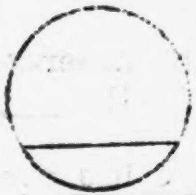
(a)



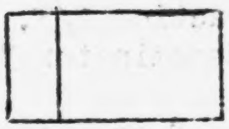
(b)



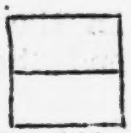
(c)



(d)



(e)



ASSIGNMENT 2

1. In the fraction 5/8, the numerator 5 shows the number of __________being used and the denominator 8 shows the number of equal parts into which the __________has been divided.

2. Write three fractions whose numerator is 1.

3. Write three fractions whose denominator is 8.

4. Write a fraction whose numerator is 1 and whose denominator is 3.

5. Write a fraction that shows that something has been divided into 6 parts and that you are talking about 5 of them.

6. In each fraction circle the denominator

$\frac{2}{3}$ $\frac{5}{6}$ $\frac{8}{9}$ $\frac{5}{13}$

7. In each fraction, draw a ring around the number that tells into how many parts each thing is divided:

$\frac{1}{4}$ of a cake

$\frac{2}{3}$ of pie

$\frac{5}{6}$ of a book

$\frac{1}{2}$ of a board

8. Draw circles around the fractions that have the same denominators:

$\frac{2}{3}$ $\frac{5}{6}$ $\frac{8}{9}$ $\frac{2}{6}$ $\frac{5}{8}$ $\frac{1}{4}$ $\frac{1}{6}$

9. Draw circles around the fractions that have the same numerators:

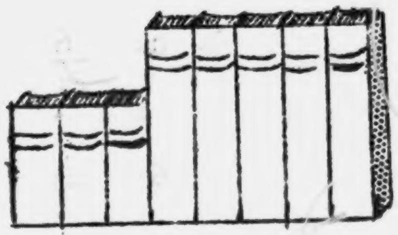
$\frac{2}{6}$ $\frac{3}{9}$ $\frac{3}{8}$ $\frac{1}{6}$ $\frac{5}{9}$ $\frac{3}{11}$

10. Write the names numerator and denominator by the correct numbers in the fraction:

$\frac{5}{8}$ ____________________

11. Draw a pie. Draw lines to show how you would divide this pie equally among 6 people.

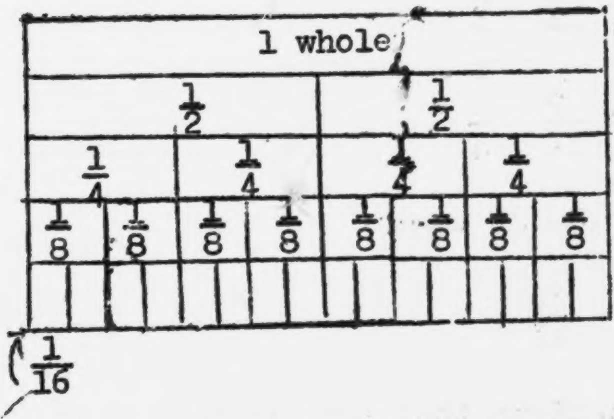
12. In the figure at the right:



a. There are ______ books in all.
b. What part of the books are small? ______
c. What part of the books are large? ______

ASSIGNMENT 3

1. From the fraction chart, pick out the larger fraction in each pair of fractions:



a. $\frac{1}{2}$ or $\frac{1}{4}$ d. $\frac{3}{4}$ or $\frac{1}{2}$ g. $\frac{3}{8}$ or $\frac{5}{16}$ j. $\frac{3}{4}$ or $\frac{10}{16}$

b. $\frac{1}{8}$ or $\frac{1}{16}$ e. $\frac{9}{16}$ or $\frac{1}{4}$ h. $\frac{1}{2}$ or $\frac{9}{16}$ k. $\frac{7}{8}$ or $\frac{3}{4}$

c. $\frac{1}{2}$ or $\frac{1}{8}$ f. $\frac{5}{8}$ or $\frac{1}{2}$ i. $\frac{7}{8}$ or $\frac{1}{2}$ l. $\frac{1}{2}$ or $\frac{8}{16}$

2. Write the following fractions in the order of their size with the smallest first:

a. $\frac{3}{4}$ $\frac{1}{2}$ $\frac{5}{8}$ $\frac{9}{16}$ $\frac{4}{4}$ $\frac{11}{16}$

b. $\frac{1}{8}$ $\frac{5}{16}$ $\frac{1}{2}$ $\frac{8}{8}$ $\frac{3}{4}$ $\frac{15}{16}$

3. Make a fraction chart showing thirds, sixths, and twelfths.

4. From your fraction chart in Problem 3, pick out the larger fraction in each pair of fractions:

   a. $\frac{1}{3}$ or $\frac{1}{6}$ c. $\frac{2}{3}$ or $\frac{5}{6}$ e. $\frac{5}{6}$ or $\frac{9}{12}$ g. $\frac{5}{6}$ or $\frac{12}{12}$

   b. $\frac{1}{12}$ or $\frac{1}{6}$ d. $\frac{8}{12}$ or $\frac{1}{3}$ f. $\frac{11}{12}$ or $\frac{2}{3}$ h. $\frac{4}{6}$ or $\frac{8}{12}$

5. From the fraction chart in Problem 1 write:

   a. Two fractions which equal 1/2
   b. Three fractions whose value is less than 1
   c. Three fractions whose value is more than 1/2
   d. Three fractions whose value is more than 1/4

6. Reduce each fraction to its lowest terms:

   a. $\frac{6}{21}$ b. $\frac{2}{6}$ c. $\frac{3}{15}$ d. $\frac{5}{10}$ e. $\frac{7}{14}$ f. $\frac{2}{4}$

   g. $\frac{4}{12}$ h. $\frac{4}{32}$ i. $\frac{7}{28}$ j. $\frac{2}{8}$ k. $\frac{6}{10}$ l. $\frac{5}{25}$

7. To reduce a fraction to its lowest terms you divide the numerator and denominator of the fraction by the same number. In each problem tell what number was used to change the fraction to its lowest terms:

   a. $\frac{6}{9} = \frac{2}{3}$ c. $\frac{7}{21} = \frac{1}{3}$ e. $\frac{14}{21} = \frac{2}{3}$

   b. $\frac{8}{10} = \frac{4}{5}$ d. $\frac{10}{12} = \frac{5}{6}$ f. $\frac{9}{12} = \frac{3}{4}$

8. Circle the fractions which are in lowest terms:

   $\frac{6}{18}$ $\frac{3}{5}$ $\frac{5}{8}$ $\frac{12}{13}$ $\frac{12}{19}$ $\frac{3}{5}$ $\frac{14}{21}$

9. Reduce to lowest terms all the fractions that can be reduced in Problem 8.

10. Find the missing numerators:

    a. $\frac{1}{4} = \frac{?}{16}$ c. $\frac{1}{3} = \frac{?}{12}$ e. $\frac{3}{4} = \frac{?}{20}$ g. $\frac{2}{5} = \frac{?}{10}$

    b. $\frac{3}{4} = \frac{?}{8}$ d. $\frac{5}{6} = \frac{?}{12}$ f. $\frac{3}{3} = \frac{?}{6}$ h. $\frac{7}{8} = \frac{?}{16}$

11. Write three fractions that have the same value as 1/3.

12. Fill in the blank spaces:

a. Changing $\frac{2}{4}$ to $\frac{1}{2}$ is changing to ________terms.

b. ________or________both numerator and denominator of a fraction by the same number does not change the value of the fraction.

13. Write the smallest number that can be divided evenly by:

a. 2 and 5 c. 8 and 16 e. 2 and 4

b. 3 and 4 d. 6 and 9 f. 4 and 5

14. Change the following fractions to fractions equal in value having 12 as a denominator:

a. $\frac{1}{4}$ b. $\frac{1}{3}$ c. $\frac{1}{2}$ d. $\frac{3}{4}$

15. Circle each number that is in simplest form:

$\frac{1}{2}$ $\frac{3}{6}$ $\frac{6}{8}$ $\frac{3}{8}$ $\frac{2}{9}$ $\frac{10}{12}$

16. Fill in the missing numbers that reduce each fraction to lowest terms:

a. $\frac{9 \div ?}{12 \div ?} = \frac{3}{4}$ b. $\frac{10 \div ?}{15 \div ?} = \frac{2}{3}$ c. $\frac{10 \div ?}{16 \div ?} = \frac{5}{8}$

17. Which pairs of fractions have the same value?

a. $\frac{3}{4}$ and $\frac{4}{8}$ b. $\frac{4}{12}$ and $\frac{1}{3}$ c. $\frac{1}{2}$ and $\frac{2}{6}$

18. Circle each fraction below that equals 1/2:

$\frac{6}{8}$ $\frac{2}{4}$ $\frac{1}{5}$ $\frac{4}{6}$ $\frac{4}{8}$ $\frac{2}{3}$ $\frac{3}{5}$ $\frac{2}{8}$ $\frac{3}{6}$ $\frac{5}{10}$

ASSIGNMENT 4

1. Fill in the missing number so that each fraction is a proper fraction:

a. $\frac{?}{3}$ b. $\frac{?}{5}$ c. $\frac{5}{?}$ d. $\frac{2}{?}$ e. $\frac{?}{13}$

2. Fill in the missing number so that each fraction is an improper fraction:

a. $\frac{?}{7}$ b. $\frac{?}{3}$ c. $\frac{?}{15}$ d. $\frac{6}{?}$ e. $\frac{7}{?}$

3. Circle each proper fraction:

$\frac{2}{3}$ $\frac{5}{8}$ $\frac{7}{6}$ $\frac{9}{3}$ $\frac{6}{8}$

4. Put each fraction below in its proper place in the table (the first two have been done for you):

$\frac{5}{8}$ $2\frac{5}{6}$ 8 $\frac{14}{11}$ $\frac{7}{7}$ $\frac{9}{9}$ $\frac{3}{4}$

$1\frac{2}{3}$ $\frac{7}{6}$ $\frac{5}{9}$ $2\frac{9}{10}$ 13 $\frac{8}{13}$ $\frac{4}{3}$

Whole Numbers	Proper Fractions	Improper Fractions	Mixed Numbers
	$\frac{5}{8}$		$1\frac{2}{3}$

5. Change to mixed numbers or whole numbers:

a. $\frac{7}{2}$ b. $\frac{6}{6}$ c. $\frac{12}{10}$ d. $\frac{13}{13}$ e. $\frac{8}{6}$ f. $\frac{14}{8}$

6. Tell which of the following is a proper fraction, improper fraction, a mixed number, and a whole number:

$\frac{3}{4}$ 7 $\frac{9}{8}$ $1\frac{3}{4}$

7. Fill in the missing words:

a. An improper fraction has a ________that is as large as or larger than the denominator.

b. A mixed number may be changed to an __________fraction.

c. Some proper fractions may be reduced to ________ __________.

d. When both numerator and denominator are the same, it is an ____________fraction.

8. Is an improper fraction always more than 1?

9. Is a proper fraction always less than 1?

10. Write 3 proper fractions; 3 improper fractions; 3 mixed numbers; 3 whole numbers.

ASSIGNMENT 5

1. A truck with a load of coal weighs 8,742 pounds. The coal weighs 4,321 pounds. How much does the truck weigh?

2. The tallest boy in Grade 9B was 74 inches tall. The shortest boy was 61 inches tall. What was the difference in their heights?

3. It is 985 miles from Chicago to Boston and 831 miles from Chicago to New York. How much greater is the distance from Chicago to Boston than from Chicago to New York?

4. The Pacific Coast of the United States is 1,872 miles long. The Gulf Coast is about 3,040 miles long. The Gulf Coast is how much longer than the Pacific Coast?

5. Tom had $80.00 in his savings account but he drew out $20.25. How much money does he have left in his account?

6. Alaska has an area of 586,400 square miles. Texas has an area of 267,339 square miles. How much larger is Alaska than Texas?

7. A car carrier hauled 4 cars from Detroit to Chicago. Each car weighed 3,122 pounds. How much did all 4 cars weigh?

8. If each of 9 passengers on a plane are allowed 40 pounds of baggage, how much can be carried for all of the passengers?

9. The number of balls used in a major league baseball game is approximately 48. If a baseball costs $2.89, what is the cost of 48 balls?

10. It is 712 airline miles from Chicago to New York. One airline makes this trip 12 times a day. Find the total number of miles traveled by this line between Chicago and New York in a day.

11. A brick of ice cream will serve 6 people. How many bricks of ice cream are needed to serve 78 people?

12. The average freight car hauls 48 tons. How many cars will be needed to haul 2,400 tons?

13. Mr. Smith delivered telephone directories. He had 17 days in which to deliver 3,655 directories. If he distributed the same number each day, how many did he deliver daily?

14. The cost of a telephone in a certain city is $4.80 a month. If we count 30 days as a month, what is the cost for one day for the telephone?

15. Jack Russell had $14.50. He paid $2.25 for a baseball bat, $3.75 for a glove, $1.85 for a ball, and $5.95 for baseball shoes. How much money did he have left?

16. Jack saves $1.25 each month for a year. How much will he have saved at the end of a year?

17. A lighthouse beacon flashes every 5 seconds. How many times does it flash in an hour?

18. There are 15 rows of cars in a parking lot, with 40 cars in a row. How many cars are in the lot?

19. A grocer bought 8 boxes of grapefruit with 12 grapefruit in a box. If he sold them for 12¢ each, how much did he receive for the grapefruit?

20. At a high school football game, tickets for adults are $1.00. Tickets for children are half price. How much will 7 children's tickets cost?

21. Mr. Adams bought 7 gallons of gasoline at $.35 a gallon. How much change should he receive from $5.00?

22. Jim weighs 106 pounds, Harry weighs 113 pounds, and Charlie weighs 108 pounds. What is their average weight?

23. A rancher bought 20 colts for $1,789.00. How much did he pay for each colt if each cost the same amount?

24. Michael has $58.50 left to pay on his bicycle. He is going to pay $4.50 each month. How many months will it take him to finish paying for the bicycle?

25. An airplane flew 1,425 miles in 3 hours. What was the average speed per hour?

26. In most large cities there are sight-seeing buses to take visitors to see the sights of the city. The bus carries 33 passengers. How many passengers can be carried on 14 trips?

27. Parking at major league baseball parks has become such a problem that groups hire buses to bring them to the ball parks. How many buses would be needed for a group of 810 if a bus will hold 45 people?

F. Addition of Fractions (Like Denominators)

(SUGGESTIONS FOR TEACHING ASSIGNMENT 6)

The work in addition of fractions will be divided into two parts:

1. Fractions with like denominators
2. Fractions with unlike denominators

Assignment 6 deals with addition with like denominators.

The denominator of a fraction represents the unit into which the whole has been divided. When you add, the units do not change. As examples:

$$\begin{array}{r} 2 \text{ inches} \\ + \underline{5 \text{ inches}} \\ 7 \text{ inches} \end{array} \qquad \begin{array}{r} 9 \text{ yards} \\ + \underline{3 \text{ yards}} \\ 12 \text{ yards} \end{array} \qquad \begin{array}{r} 8 \text{ miles} \\ \underline{+ 5 \text{ miles}} \\ 13 \text{ miles} \end{array}$$

So also in fractions:

$$\begin{array}{r} 3 \text{ eighths} \\ \underline{+ 2 \text{ eighths}} \\ 5 \text{ eighths} \end{array} \qquad \begin{array}{r} 2 \text{ ninths} \\ \underline{+ 5 \text{ ninths}} \\ 7 \text{ ninths} \end{array} \qquad \begin{array}{r} \frac{1}{4} \\ + \frac{2}{4} \\ \hline \frac{3}{4} \end{array} \qquad \begin{array}{r} \frac{2}{7} \\ + \frac{3}{7} \\ \hline \frac{5}{7} \end{array}$$

The common mistake made in addition of these fractions is:

$$\frac{2}{8} + \frac{3}{8} = \frac{5}{16}$$

The student who makes this mistake shows that he does not understand the meaning of the denominator. The denominator is the unit. The unit does not change in addition.

Problems should be taken in the following order:

I. Sums involving proper fractions - not reducible

$$\begin{array}{c} \frac{4}{6} \\ \frac{1}{6} \\ \hline \frac{5}{6} \end{array} \qquad \begin{array}{c} \frac{1}{3} \\ \frac{1}{3} \\ \hline \frac{2}{3} \end{array} \qquad \begin{array}{c} 9\frac{1}{8} \\ \frac{2}{8} \\ \hline 9\frac{3}{8} \end{array} \qquad \begin{array}{c} 6\frac{2}{8} \\ 2\frac{1}{8} \\ \hline 8\frac{3}{8} \end{array} \qquad \begin{array}{c} 5\frac{5}{12} \\ 6\frac{2}{12} \\ \hline 11\frac{7}{12} \end{array}$$

II. Sums involving proper fractions - reducible

$$\begin{array}{ccccc}
\frac{1}{4} & \frac{4}{9} & 2\frac{5}{8} & 7\frac{5}{12} & 7\frac{2}{16} \\
+\frac{1}{4} & +\frac{2}{9} & +7\frac{1}{8} & +6\frac{4}{12} & +\frac{6}{16} \\
\hline
\frac{2}{4}=\frac{1}{2} & \frac{6}{9}=\frac{2}{3} & 9\frac{6}{8}=9\frac{3}{4} & 13\frac{9}{12}=13\frac{3}{4} & 7\frac{8}{16}=7\frac{1}{2}
\end{array}$$

III. Sums involving improper fractions - not reducible

$$\begin{array}{ccccc}
\frac{2}{3} & \frac{7}{12} & \frac{1}{8} & 7\frac{3}{8} & 9\frac{10}{16} \\
+\frac{2}{3} & +\frac{10}{12} & +\frac{7}{8} & +8\frac{6}{8} & +5\frac{6}{16} \\
\hline
\frac{4}{3}=1\frac{1}{3} & \frac{17}{12}=1\frac{5}{12} & \frac{8}{8}=1 & 15\frac{9}{8}=16\frac{1}{8} & 14\frac{16}{16}=15
\end{array}$$

IV. Sums involving improper fractions - reducible

$$\begin{array}{ccc}
\frac{5}{6} & \frac{5}{8} & 7\frac{3}{4} \\
+\frac{3}{6} & +\frac{5}{8} & +9\frac{3}{4} \\
\hline
\frac{8}{6}=1\frac{2}{6}=1\frac{1}{3} & \frac{10}{8}=1\frac{2}{8}=1\frac{1}{4} & 16\frac{6}{4}=17\frac{2}{4}=17\frac{1}{2}
\end{array}$$

The problems in Assignment 6 have been grouped according to I to IV above as follows:

I.	Problems 1 - 15	III.	Problems 31 - 45
II.	Problems 16 - 30	IV.	Problems 46 - 60

It is obvious that this work will cover several days and the examples above should be worked out very carefully with the students before the students attempt to solve any of the problems.

ASSIGNMENT 6

1. $\frac{1}{5} + \frac{3}{5}$
2. $\frac{2}{6} + \frac{3}{6}$
3. $\frac{1}{8} + \frac{4}{8}$
4. $\frac{1}{4} + \frac{2}{4}$
5. $\frac{1}{10} + \frac{2}{10}$
6. $\frac{1}{8} + \frac{6}{8}$
7. $\frac{2}{5} + \frac{1}{5}$
8. $6\frac{5}{8} + 7\frac{2}{8}$
9. $7\frac{7}{9} + 9\frac{1}{9}$
10. $5\frac{6}{8} + 9\frac{1}{8}$
11. $5\frac{2}{5} + 5\frac{2}{5}$
12. $\frac{4}{12} + 19\frac{1}{12}$
13. $27\frac{1}{9} + 3\frac{7}{9}$
14. $6\frac{3}{10} + \frac{6}{10}$
15. $18\frac{2}{16} + 5\frac{5}{16}$
16. $\frac{1}{6} + \frac{2}{6}$
17. $\frac{3}{8} + \frac{3}{8}$
18. $\frac{1}{4} + \frac{1}{4}$
19. $\frac{3}{8} + \frac{1}{8}$
20. $\frac{1}{16} + \frac{1}{16}$
21. $\frac{1}{10} + \frac{3}{10}$
22. $\frac{1}{12} + \frac{1}{12}$
23. $15\frac{3}{6} + 2\frac{1}{6}$
24. $7\frac{1}{10} + 18\frac{3}{10}$
25. $7\frac{1}{16} + 30\frac{3}{16}$
26. $9\frac{1}{6} + 2\frac{1}{6}$
27. $23\frac{3}{10} + \frac{3}{10}$
28. $36\frac{1}{9} + 5\frac{2}{9}$
29. $16\frac{3}{8} + 17\frac{3}{8}$
30. $9\frac{1}{4} + 19\frac{1}{4}$
31. $\frac{7}{10} + \frac{6}{10}$
32. $\frac{2}{8} + \frac{7}{8}$
33. $\frac{5}{6} + \frac{2}{6}$
34. $\frac{3}{5} + \frac{4}{5}$
35. $\frac{11}{12} + \frac{2}{12}$
36. $\frac{7}{8} + \frac{6}{8}$
37. $\frac{1}{4} + \frac{3}{4}$
38. $\frac{9}{12} + \frac{3}{12}$
39. $36\frac{5}{8} + 5\frac{6}{8}$
40. $38\frac{2}{5} + 7\frac{4}{5}$
41. $27\frac{4}{6} + 4\frac{3}{6}$
42. $31\frac{3}{6} + 49\frac{4}{6}$
43. $20\frac{6}{8} + 7\frac{5}{8}$
44. $18\frac{7}{12} + 2\frac{5}{12}$
45. $3\frac{5}{16} + 8\frac{11}{16}$
46. $\frac{3}{4} + \frac{3}{4}$
47. $\frac{9}{10} + \frac{3}{10}$

48. $\begin{array}{r} \frac{5}{8} \\ + \frac{7}{8} \\ \hline \end{array}$

49. $\begin{array}{r} \frac{5}{6} \\ + \frac{5}{6} \\ \hline \end{array}$

50. $\begin{array}{r} \frac{7}{8} \\ + \frac{7}{8} \\ \hline \end{array}$

51. $\begin{array}{r} 5\frac{5}{8} \\ + 35\frac{5}{8} \\ \hline \end{array}$

52. $\begin{array}{r} 4\frac{6}{9} \\ + 4\frac{6}{9} \\ \hline \end{array}$

53. $\begin{array}{r} 19\frac{7}{10} \\ + 73\frac{7}{10} \\ \hline \end{array}$

54. $\begin{array}{r} 7\frac{9}{16} \\ + 9\frac{9}{16} \\ \hline \end{array}$

55. $\begin{array}{r} 43\frac{7}{8} \\ + 30\frac{3}{8} \\ \hline \end{array}$

56. $\begin{array}{r} 7\frac{9}{10} \\ + 2\frac{3}{10} \\ \hline \end{array}$

57. $\begin{array}{r} 17\frac{5}{6} \\ + 5\frac{4}{6} \\ \hline \end{array}$

58. $\begin{array}{r} 49\frac{5}{8} \\ + 16\frac{5}{8} \\ \hline \end{array}$

59. $\begin{array}{r} 9\frac{9}{10} \\ +6\frac{7}{10} \\ \hline \end{array}$

60. $\begin{array}{r} 28\frac{7}{12} \\ +5\frac{7}{12} \\ \hline \end{array}$

61. $\begin{array}{r} 18\frac{8}{12} \\ + \frac{6}{12} \\ \hline \end{array}$

62. $\begin{array}{r} 5\frac{9}{10} \\ + 37\frac{9}{10} \\ \hline \end{array}$

63. $\begin{array}{r} 7\frac{3}{10} \\ + 9\frac{2}{10} \\ \hline \end{array}$

64. $\begin{array}{r} \frac{2}{7} \\ + 9\frac{1}{7} \\ \hline \end{array}$

65. $\begin{array}{r} 3\frac{1}{9} \\ + 3\frac{5}{9} \\ \hline \end{array}$

66. If Jack has to walk 1/8 mile to the store and 3/8 more miles to the ball park, how far does he walk in all?

67. During one hour a gas station attendant sold $8\frac{1}{2}$ gallons and $14\frac{1}{2}$ gallons of gasoline. How much gas did he sell altogether?

68. A man spends 1/4 of his income on food and 1/4 on his home. How much does he spend on these two items?

69. Mrs. Smith bought 1/4 yard of muslin and $3\frac{1}{4}$ yards of silk at a sale. How much material did she buy altogether?

70. After cutting a pie into fifths, Mrs. Owens gave 1/5 to Jim and 1/5 to Jane. What part of the pie did she give them?

71. On Saturday, Jim worked $1\frac{1}{4}$ hours mowing the lawn and $2\frac{3}{4}$ hours cleaning the basement. How many hours did he work altogether?

72. The Rich family lives $1\frac{3}{8}$ miles from school. How far do their children walk to and from school?

73. Jim worked $2\frac{1}{4}$ hours on Monday, $4\frac{3}{4}$ on Tuesday, and $5\frac{1}{4}$ hours on Wednesday. How many hours did he work altogether?

74. Mrs. Swanson bought $4\frac{1}{4}$ yards of rayon and $10\frac{3}{4}$ yards of silk. How much material did she buy?

75. Jim walked to George's house, a distance of 5/8 of a mile. When he got there he borrowed George's bike and rode on to the baseball field, a distance of 1-3/8 miles. How far did Jim travel?

G. Addition of Fractions (Unlike Denominators)

(SUGGESTIONS FOR TEACHING ASSIGNMENT 7)

As was stated previously, the problems in addition and subtraction (with unlike denominators) will be limited to denominators of 2, 3, 4, 5, 6, 8, 10, 12 and 16.

Emphasize again the meaning of the denominator of a fraction. The denominator is the unit into which the whole thing has been divided. If the units are different, they cannot be added. As examples:

3 dogs
+ 2 hats

3 quarts
+ 2 miles

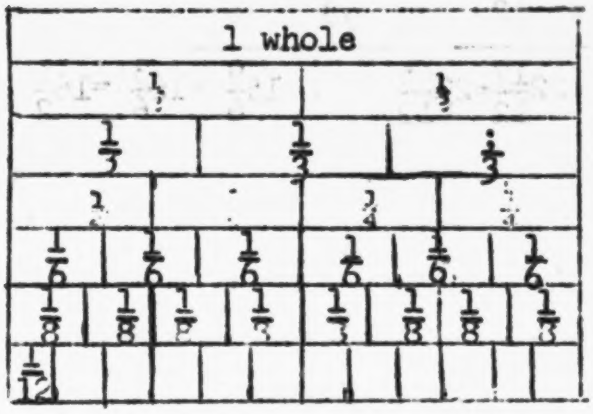
3 yards
+ 2 inches

$$\begin{array}{r} \frac{3}{16} \\ + \frac{2}{8} \\ \hline \end{array}$$

In all four cases you are attempting to add units that are different. In the first two you cannot change to any common unit, therefore they can never be added. In the third example, the yards can be changed to inches and then addition can be performed. In the last example the fractions cannot be added as they stand because the units (the denominators) are different (sixteenths and eighths), but you can convert them to a common unit (sixteenths) and then the fractions can be added.

To change fractions to a common denominator, you use one of the golden rules of fractions. You can multiply the numerator and denominator of a fraction by the same number without changing the value of the fraction.

It might be well at this point to put the fraction chart on the blackboard and go over it orally finding the common denominators.



Ask what denominator is common to:

a. $\frac{1}{2}$ and $\frac{1}{4}$ (4, 8, 12)

b. $\frac{1}{2}, \frac{1}{4}, \frac{5}{8}$ (8)

c. $\frac{2}{3}, \frac{1}{6}, \frac{5}{12}$ (12)

d. $\frac{1}{2}, \frac{1}{3}$ (6, 12)

In most examples there is more than one common denominator. You use the smallest common denominator because you will have smaller numbers to work with. It is a good idea to do one problem to show that, although it is best to use the lowest common denominator you can get the correct answer by using any common denominator.

$$\begin{array}{r} \frac{1}{3} = \frac{2}{6} \\ \frac{1}{2} = \frac{3}{6} \\ \hline \frac{5}{6} \end{array} \qquad \begin{array}{r} \frac{1}{3} = \frac{4}{12} \\ \frac{1}{2} = \frac{6}{12} \\ \hline \frac{10}{12} = \frac{5}{6} \end{array}$$

As you do each of the following examples at the blackboard, show that to change to a new denominator you multiply the numerator and denominator by the same number.

$$\begin{array}{r} \frac{1}{2} = \frac{2}{4} \\ + \frac{1}{4} = \frac{1}{4} \\ \hline \frac{3}{4} \end{array} \qquad \begin{array}{r} \frac{3}{4} = \frac{6}{8} \\ + \frac{1}{8} = \frac{1}{8} \\ \hline \frac{7}{8} \end{array} \qquad \begin{array}{r} 3\frac{3}{8} = 3\frac{3}{8} \\ + 5\frac{1}{4} = 5\frac{2}{8} \\ \hline 8\frac{5}{8} \end{array}$$

$$\begin{array}{r} \frac{1}{4} = \frac{3}{12} \\ + \frac{1}{3} = \frac{4}{12} \\ \hline \frac{7}{12} \end{array} \qquad \begin{array}{r} \frac{1}{6} = \frac{2}{12} \\ + \frac{3}{4} = \frac{9}{12} \\ \hline \frac{11}{12} \end{array} \qquad \begin{array}{r} \frac{1}{2} = \frac{3}{6} \\ + 9\frac{1}{6} = 9\frac{1}{6} \\ \hline 9\frac{4}{6} = 9\frac{2}{3} \end{array}$$

$$\begin{array}{r} \frac{2}{4} = \frac{6}{12} \\ + \frac{5}{6} = \frac{10}{12} \\ \hline \frac{16}{12} = 1\frac{4}{12} = 1\frac{1}{3} \end{array} \qquad \begin{array}{r} 15\frac{3}{4} = 15\frac{9}{12} \\ + 7\frac{2}{3} = 7\frac{8}{12} \\ \hline 22\frac{17}{12} = 23\frac{5}{12} \end{array} \qquad \begin{array}{r} 7\frac{5}{6} = 7\frac{5}{6} \\ + 8\frac{2}{3} = 8\frac{4}{6} \\ \hline 15\frac{9}{6} = 16\frac{3}{6} = 16\frac{1}{2} \end{array}$$

ASSIGNMENT 7

1. Fill in the missing numerators using Figure A.

a. $\frac{1}{4} = \frac{}{8}$ b. $\frac{1}{2} = \frac{}{4}$ c. $\frac{3}{4} = \frac{}{8}$ d. $\frac{1}{8} = \frac{}{16}$ e. $\frac{5}{8} = \frac{}{16}$

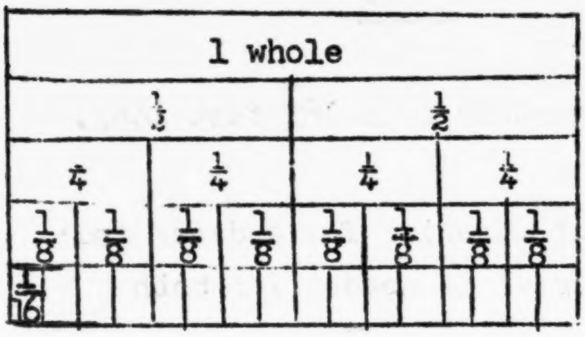
2. Fill in the missing numerators using Figure B.

a. $\frac{1}{2} = \frac{}{6}$ b. $\frac{1}{6} = \frac{}{12}$ c. $\frac{4}{6} = \frac{}{12}$ d. $\frac{1}{2} = \frac{}{6}$

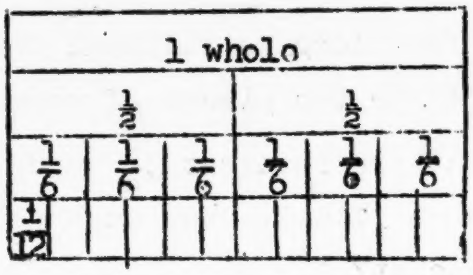
3. Fill in the missing numerators using Figure C.

a. $\frac{1}{3} = \frac{}{6}$ b. $\frac{1}{6} = \frac{}{12}$ c. $\frac{2}{3} = \frac{}{12}$ d. $\frac{5}{6} = \frac{}{12}$

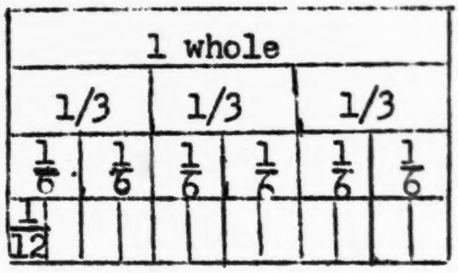
A.



B.



C.



In each problem replace the question mark by the correct number that multiplies both numerator and denominator of the fraction.

4. $\frac{2\,(x\,?)}{3\,(x\,?)} = \frac{8}{12}$ 5. $\frac{3\,(x\,?)}{4\,(x\,?)} = \frac{9}{12}$ 6. $\frac{5\,(x\,?)}{6\,(x\,?)} = \frac{10}{12}$ 7. $\frac{1\,(x\,?)}{2\,(x\,?)} =$

Add:

8. $\begin{array}{r} \frac{3}{16} \\ \frac{1}{2} \\ \hline \end{array}$ 9. $\begin{array}{r} \frac{1}{4} \\ \frac{1}{2} \\ \hline \end{array}$ 10. $\begin{array}{r} \frac{1}{4} \\ \frac{3}{8} \\ \hline \end{array}$ 11. $\begin{array}{r} \frac{3}{8} \\ \frac{1}{2} \\ \hline \end{array}$ 12. $\begin{array}{r} 2\frac{2}{3} \\ 7\frac{1}{6} \\ \hline \end{array}$ 13. $\begin{array}{r} 6\frac{1}{8} \\ 4\frac{3}{4} \\ \hline \end{array}$ 14. $\begin{array}{r} 10\frac{3}{8} \\ 2\frac{1}{2} \\ \hline \end{array}$

15. $\begin{array}{r} 9\frac{3}{8} \\ 6\frac{3}{4} \\ \hline \end{array}$ 16. $\begin{array}{r} 7\frac{3}{4} \\ 7\frac{7}{8} \\ \hline \end{array}$ 17. $\begin{array}{r} \frac{2}{3} \\ 15\frac{7}{12} \\ \hline \end{array}$ 18. $\begin{array}{r} 12\frac{3}{4} \\ 6\frac{5}{12} \\ \hline \end{array}$ 19. $\begin{array}{r} 11\frac{5}{6} \\ 5\frac{2}{3} \\ \hline \end{array}$ 20. $\begin{array}{r} 8\frac{1}{4} \\ 9\frac{7}{12} \\ \hline \end{array}$

21. $\begin{array}{r}\frac{3}{4}\\ \underline{\frac{2}{3}}\end{array}$
22. $\begin{array}{r}\frac{2}{3}\\ \underline{\frac{1}{2}}\end{array}$
23. $\begin{array}{r}\frac{1}{2}\\ \underline{\frac{3}{5}}\end{array}$
24. $\begin{array}{r}\frac{3}{4}\\ \underline{\frac{1}{6}}\end{array}$
25. $\begin{array}{r}\frac{1}{4}\\ \underline{\frac{5}{6}}\end{array}$
26. $\begin{array}{r}\frac{5}{6}\\ \underline{\frac{3}{4}}\end{array}$

27. $\begin{array}{r}3\frac{2}{3}\\ \underline{6\frac{1}{4}}\end{array}$
28. $\begin{array}{r}8\frac{1}{2}\\ \underline{6\frac{3}{5}}\end{array}$
29. $\begin{array}{r}4\frac{1}{2}\\ \underline{8\frac{2}{3}}\end{array}$
30. $\begin{array}{r}6\frac{5}{6}\\ \underline{10\frac{2}{4}}\end{array}$
31. $\begin{array}{r}\frac{1}{16}\\ \underline{\frac{1}{8}}\end{array}$
32. $\begin{array}{r}\frac{3}{16}\\ \underline{\frac{3}{8}}\end{array}$

33. $\begin{array}{r}\frac{5}{16}\\ \underline{\frac{1}{8}}\end{array}$
34. $\begin{array}{r}\frac{1}{2}\\ \underline{\frac{5}{16}}\end{array}$
35. $\begin{array}{r}\frac{3}{4}\\ \underline{\frac{11}{16}}\end{array}$
36. $\begin{array}{r}\frac{1}{8}\\ \underline{\frac{5}{16}}\end{array}$
37. $\begin{array}{r}15\frac{3}{8}\\ \underline{7\frac{7}{16}}\end{array}$

38. A rope $12\frac{1}{2}$ feet long is fastened to another rope $16\frac{7}{8}$ feet long. How long are the two pieces of rope?

39. A size 12 pattern requires $3\frac{5}{8}$ yards of material for a dress and $2\frac{1}{4}$ yards for a jacket. How much material is needed for both dress and jacket?

40. Mrs. East used $\frac{3}{4}$ dozen eggs in a salad and $\frac{2}{3}$ dozen eggs for a cake. How many dozen eggs did she use?

41. The Weather Bureau stated the snowfall in December was $3\frac{1}{4}$ inches and in January it was $4\frac{1}{2}$ inches. What was the total snowfall for December and January?

42. The Prices decided to buy new carpeting for their hall and stairway. They needed $10\frac{3}{4}$ yards of carpeting for the stairs and $4\frac{1}{2}$ yards for the hall. How many yards did they need altogether?

43. A hiking club went on 3 hikes last summer. The first hike covered $2\frac{1}{4}$ miles, the second $2\frac{3}{8}$ miles and the third $3\frac{1}{8}$ miles. How many miles did they hike?

44. Harold played the trumpet in the school band. On Monday he practiced $1\frac{3}{4}$ hours; on Tuesday, $2\frac{1}{2}$ hours, and on Wednesday, $2\frac{3}{4}$ hours. How many hours did he practice during the three days?

45. Carol does baby sitting after school. One day she sat $1\frac{1}{2}$ hours, a second day she sat $2\frac{1}{4}$ hours and a third day 4 hours. Find the total number of hours of baby sitting for the three days.

H. Subtraction of Fractions (No Borrowing)

(SUGGESTIONS FOR TEACHING ASSIGNMENT 8)

The teaching of subtraction of fractions should parallel closely the steps in addition of fractions. The work in Assignment 8 deals with subtraction of fractions with no borrowing involved. The sequence of doing the problems will be the same. Do the following problems at the blackboard:

$$\begin{array}{r} \text{7 books} \\ -\ \underline{\text{2 books}} \\ \text{5 books} \end{array} \qquad \begin{array}{r} \text{7 eighths} \\ -\ \underline{\text{2 eighths}} \\ \text{5 eighths} \end{array} \qquad \begin{array}{r} \frac{7}{8} \\ -\frac{2}{8} \\ \hline \frac{5}{8} \end{array}$$

It should not be necessary to continue with illustrations but to go directly to the working of problems.

$$1.\ \begin{array}{r} \frac{11}{12} \\ -\frac{6}{12} \\ \hline \frac{5}{12} \end{array} \quad 2.\ \begin{array}{r} \frac{7}{8} \\ -\frac{5}{8} \\ \hline \frac{2}{8}=\frac{1}{4} \end{array} \quad 3.\ \begin{array}{r} 4\frac{2}{3} \\ -2\frac{1}{3} \\ \hline 2\frac{1}{3} \end{array} \quad 4.\ \begin{array}{r} 2\frac{3}{8} \\ -1\frac{1}{8} \\ \hline 1\frac{2}{8}=1\frac{1}{4} \end{array} \quad 5.\ \begin{array}{r} \frac{1}{2}=\frac{2}{4} \\ -\frac{1}{4}=\frac{1}{4} \\ \hline \frac{1}{4} \end{array} \quad 6.\ \begin{array}{r} \frac{6}{8}=\frac{6}{8} \\ -\frac{1}{4}=\frac{2}{8} \\ \hline \frac{4}{8}=\frac{1}{2} \end{array}$$

$$7.\ \begin{array}{r} 5\frac{1}{2}=5\frac{2}{4} \\ -2\frac{1}{4}=2\frac{1}{4} \\ \hline 3\frac{1}{4} \end{array} \quad 8.\ \begin{array}{r} 9\frac{2}{3}=9\frac{4}{6} \\ -5\frac{1}{6}=5\frac{1}{6} \\ \hline 4\frac{3}{6}=4\frac{1}{2} \end{array} \quad 9.\ \begin{array}{r} 7\frac{2}{3} \\ -\frac{2}{3} \\ \hline 7 \end{array} \quad 10.\ \begin{array}{r} 9\frac{1}{2} \\ -7 \\ \hline 2\frac{1}{2} \end{array} \quad 11.\ \begin{array}{r} 9\frac{5}{6} \\ -\frac{1}{6} \\ \hline 9\frac{4}{6}=9\frac{2}{3} \end{array}$$

$$12.\ \begin{array}{r} 7\frac{2}{3} \\ -7 \\ \hline \frac{2}{3} \end{array} \quad 13.\ \begin{array}{r} \frac{7}{8} \\ -\frac{7}{8} \\ \hline 0 \end{array}$$

In these thirteen problems a number of combinations have been illustrated. Each of the examples should be explained carefully before Assignment 8 is tackled. Attempt in the teaching of subtraction of fractions to eliminate the expression "bring down" a number. In the two examples below, by "bringing down" a number the correct answer is obtained in the first example, but it results in an incorrect answer in the second example.

$$\begin{array}{r} 7\frac{2}{3} \\ -5 \\ \hline 2\frac{2}{3} \end{array} \qquad \begin{array}{r} 7 \\ -5\frac{2}{3} \\ \hline 2\frac{2}{3} \end{array}$$

The student in many cases is not able to keep it straight so the best policy is to eliminate it altogether.

I. Subtraction of Fractions (Borrowing)

(SUGGESTIONS FOR TEACHING ASSIGNMENT 9)

The method of borrowing in subtraction of fractions is the same as the method of borrowing in whole numbers. Review one or two problems similar to the following:

$$\begin{array}{rcl}
72 = 7 \text{ tens} + 2 \text{ ones} & = & 6 \text{ tens} + 12 \text{ ones} \\
\underline{-59 = 5 \text{ tens} + 9 \text{ ones}} & = & \underline{5 \text{ tens} + \ \ 9 \text{ ones}} \\
 & & 1 \text{ ten} + \ \ 3 \text{ ones} = 10 + 3 = 13
\end{array}$$

Keep these points in mind with respect to borrowing:

1. Borrow when you have to borrow.
2. Borrow what you need.
3. Combine what you had and what you borrow together.

Explain the following examples carefully:

$$\begin{array}{r}
5\frac{3}{4} \\
-\ 2\frac{2}{4} \\
\hline
3\frac{1}{4}
\end{array}$$

In this problem you do not have to borrow because you can subtract $\frac{2}{4}$ from $\frac{3}{4}$.

$$\begin{array}{rcl}
5\frac{2}{4} & = & 4\frac{6}{4} \\
-\ 2\frac{3}{4} & = & 2\frac{3}{4} \\
\hline
 & & 2\frac{3}{4}
\end{array}$$

In this problem you cannot subtract $\frac{3}{4}$ from $\frac{2}{4}$, therefore you must borrow. Borrow 1 from the 5 and change it to fourths (borrow what you need).

$\frac{4}{4} + \frac{2}{4} = \frac{6}{4}$ (combine what you had and what you borrowed together.)

Work carefully a number of examples at the blackboard to make sure the process is understood:

$$\begin{array}{cccc}
4\frac{1}{3} = 3\frac{4}{3} & 7\frac{2}{4} = 6\frac{6}{4} & 7\frac{1}{6} = 6\frac{7}{6} & 3\frac{1}{2} = 3\frac{2}{4} = 2\frac{6}{4} \\
2\frac{2}{3} = 2\frac{2}{3} & 3\frac{3}{4} = 3\frac{3}{4} & 2\frac{5}{6} = 2\frac{5}{6} & 1\frac{3}{4} = 1\frac{3}{4} = 1\frac{3}{4} \\
\hline
1\frac{2}{3} & 3\frac{3}{4} & 4\frac{2}{6} = 4\frac{1}{3} & 1\frac{3}{4}
\end{array}$$

One of the most troublesome problems in borrowing is the case where there is no fraction in the minuend. Avoid the expression "bring down."

$$\begin{array}{rcl}
4 & = & 3\frac{3}{3} \\
\frac{1}{3} & = & \frac{1}{3} \\
\hline
 & & 3\frac{2}{3}
\end{array}
\qquad\qquad
\begin{array}{rcl}
1 & = & \frac{6}{6} \\
\frac{5}{6} & = & \frac{5}{6} \\
\hline
 & & \frac{1}{6}
\end{array}$$

ASSIGNMENT 8

Subtract:

1. $\frac{4}{5}$	2. $\frac{4}{9}$	3. $\frac{4}{4}$	4. $\frac{7}{8}$	5. $\frac{5}{12}$	6. $\frac{7}{10}$	7. $\frac{3}{4}$
$\underline{\frac{1}{5}}$	$\underline{\frac{2}{9}}$	$\underline{\frac{1}{4}}$	$\underline{\frac{5}{8}}$	$\underline{\frac{1}{12}}$	$\underline{\frac{3}{10}}$	$\underline{\frac{3}{4}}$

8. $9\frac{2}{5}$	9. $12\frac{3}{7}$	10. $11\frac{4}{5}$	11. $5\frac{5}{6}$	12. $7\frac{7}{8}$	13. $8\frac{3}{10}$
$\underline{6\frac{1}{5}}$	$\underline{6\frac{1}{7}}$	$\underline{7\frac{3}{5}}$	$\underline{1\frac{1}{6}}$	$\underline{7\frac{5}{8}}$	$\underline{1\frac{1}{10}}$

14. $5\frac{7}{12}$	15. $\frac{2}{3}$	16. $\frac{5}{6}$	17. $\frac{1}{3}$	18. $\frac{3}{4}$	19. $\frac{7}{8}$
$\underline{2\frac{5}{12}}$	$\underline{\frac{1}{6}}$	$\underline{\frac{1}{2}}$	$\underline{\frac{1}{6}}$	$\underline{\frac{3}{8}}$	$\underline{\frac{1}{2}}$

20. $10\frac{2}{3}$	21. $8\frac{2}{3}$	22. $9\frac{1}{2}$	23. $9\frac{5}{6}$	24. $9\frac{2}{3}$	25. $8\frac{3}{5}$
$\underline{4\frac{2}{9}}$	$\underline{2\frac{1}{9}}$	$\underline{6\frac{1}{10}}$	$\underline{7\frac{1}{3}}$	$\underline{5\frac{1}{6}}$	$\underline{\frac{2}{5}}$

26. $6\frac{3}{7}$	27. $2\frac{1}{6}$	28. $9\frac{2}{5}$	29. $3\frac{5}{6}$	30. $8\frac{3}{10}$	31. $9\frac{1}{2}$
$\underline{\frac{1}{7}}$	$\underline{\frac{1}{6}}$	$\underline{\frac{2}{5}}$	$\underline{\frac{1}{6}}$	$\underline{\frac{1}{10}}$	$\underline{9}$

32. $6\frac{4}{12}$	33. $8\frac{1}{3}$	34. $3\frac{2}{5}$	35. $47\frac{5}{8}$	36. $123\frac{3}{4}$
$\underline{6}$	$\underline{\frac{1}{3}}$	$\underline{3}$	$\underline{22\frac{1}{2}}$	$\underline{49\frac{1}{4}}$

37. Helen had 1/8 pound of chopped fruit. The cake recipe calls for 7/8 pound. How much more does she need?

38. Mrs. Lind had $2\frac{3}{4}$ dozen eggs. She used $1\frac{1}{4}$ dozen at breakfast. How many dozen does she have left?

39. Jim played badminton for $2\frac{1}{2}$ hours and Ted played for $1\frac{1}{3}$ hours. How much longer did Jim play than Ted?

40. Mary is $58\frac{1}{2}$ inches tall and Martha is $60\frac{3}{4}$ inches tall. How much taller is Martha than Mary?

41. By train it is $191\frac{9}{10}$ miles from Chicago to Springfield. From Chicago to Clinton is $147\frac{3}{10}$ miles. How much farther is it to Springfield than it is to Clinton?

42. A sheet of letter paper is $6\frac{1}{4}$ inches wide, and the envelope is $6\frac{3}{4}$ inches wide. The envelope is how much wider than the paper?

ASSIGNMENT 9

Subtract:

1. $\begin{array}{r} 11\frac{2}{5} \\ \underline{3\frac{4}{5}} \end{array}$ 2. $\begin{array}{r} 9\frac{1}{3} \\ \underline{2\frac{2}{3}} \end{array}$ 3. $\begin{array}{r} 7\frac{1}{9} \\ \underline{6\frac{5}{9}} \end{array}$ 4. $\begin{array}{r} 7\frac{1}{5} \\ \underline{2\frac{4}{5}} \end{array}$ 5. $\begin{array}{r} 8\frac{1}{3} \\ \underline{5\frac{2}{3}} \end{array}$ 6. $\begin{array}{r} 14\frac{1}{7} \\ \underline{9\frac{5}{7}} \end{array}$

7. $\begin{array}{r} 6\frac{1}{12} \\ \underline{2\frac{5}{12}} \end{array}$ 8. $\begin{array}{r} 15\frac{1}{10} \\ \underline{6\frac{3}{10}} \end{array}$ 9. $\begin{array}{r} 12\frac{1}{8} \\ \underline{4\frac{7}{8}} \end{array}$ 10. $\begin{array}{r} 12\frac{1}{8} \\ \underline{9\frac{5}{8}} \end{array}$ 11. $\begin{array}{r} 7\frac{5}{12} \\ \underline{3\frac{7}{12}} \end{array}$ 12. $\begin{array}{r} 10\frac{5}{8} \\ \underline{7\frac{7}{8}} \end{array}$

13. $\begin{array}{r} 7\frac{3}{10} \\ \underline{4\frac{7}{10}} \end{array}$ 14. $\begin{array}{r} 18\frac{1}{6} \\ \underline{12\frac{5}{6}} \end{array}$ 15. $\begin{array}{r} 5\frac{3}{8} \\ \underline{4\frac{7}{8}} \end{array}$ 16. $\begin{array}{r} 4\frac{1}{2} \\ \underline{1\frac{3}{4}} \end{array}$ 17. $\begin{array}{r} 8\frac{1}{4} \\ \underline{1\frac{5}{8}} \end{array}$ 18. $\begin{array}{r} 8\frac{2}{3} \\ \underline{2\frac{5}{6}} \end{array}$

19. $\begin{array}{r} 8\frac{3}{8} \\ \underline{2\frac{1}{2}} \end{array}$ 20. $\begin{array}{r} 7\frac{1}{10} \\ \underline{1\frac{2}{5}} \end{array}$ 21. $\begin{array}{r} 5\frac{3}{8} \\ \underline{2\frac{3}{4}} \end{array}$ 22. $\begin{array}{r} 9\frac{1}{2} \\ \underline{2\frac{5}{6}} \end{array}$ 23. $\begin{array}{r} 7\frac{1}{3} \\ \underline{2\frac{5}{6}} \end{array}$ 24. $\begin{array}{r} 9\frac{1}{6} \\ \underline{2\frac{5}{12}} \end{array}$

25. $\begin{array}{r} 11\frac{2}{3} \\ \underline{4\frac{3}{4}} \end{array}$ 26. $\begin{array}{r} 8\frac{1}{2} \\ \underline{4\frac{2}{3}} \end{array}$ 27. $\begin{array}{r} 7\frac{1}{4} \\ \underline{3\frac{1}{3}} \end{array}$ 28. $\begin{array}{r} 9\frac{1}{5} \\ \underline{7\frac{1}{2}} \end{array}$ 29. $\begin{array}{r} 9\frac{1}{4} \\ \underline{3\frac{2}{3}} \end{array}$ 30. $\begin{array}{r} 7\frac{1}{2} \\ \underline{5\frac{2}{3}} \end{array}$

31. $\begin{array}{r} 10\frac{1}{4} \\ \underline{6\frac{1}{3}} \end{array}$ 32. $\begin{array}{r} 9\frac{1}{2} \\ \underline{5\frac{3}{5}} \end{array}$ 33. $\begin{array}{r} 3 \\ \underline{-\frac{1}{4}} \end{array}$ 34. $\begin{array}{r} 5 \\ \underline{-\frac{1}{2}} \end{array}$ 35. $\begin{array}{r} 12 \\ \underline{-\frac{3}{8}} \end{array}$ 36. $\begin{array}{r} 2 \\ \underline{-\frac{7}{12}} \end{array}$

37. $\begin{array}{r} 14 \\ -\ \frac{4}{10} \\ \hline \end{array}$ 38. $\begin{array}{r} 20 \\ -\ 3\frac{5}{8} \\ \hline \end{array}$ 39. $\begin{array}{r} 5 \\ -\ 2\frac{3}{4} \\ \hline \end{array}$ 40. $\begin{array}{r} 15 \\ -\ 8\frac{1}{2} \\ \hline \end{array}$ 41. $\begin{array}{r} 16 \\ -\ 5\frac{1}{8} \\ \hline \end{array}$ 42. $\begin{array}{r} 18 \\ -\ 8\frac{5}{12} \\ \hline \end{array}$

43. $1 - \frac{3}{5}$ 44. $1 - \frac{1}{4}$ 45. $1 - \frac{7}{10}$ 46. $1 - \frac{1}{2}$

47. $\begin{array}{r} 67 \\ -\ 21\frac{5}{8} \\ \hline \end{array}$ 48. $\begin{array}{r} 67\frac{5}{8} \\ -\ 21 \\ \hline \end{array}$ 49. $\begin{array}{r} 19 \\ -\ 9\frac{7}{16} \\ \hline \end{array}$ 50. $\begin{array}{r} 19\frac{7}{16} \\ -\ 9 \\ \hline \end{array}$

51. In each problem circle the mistake:

a. $\begin{array}{r} 3\frac{5}{6} = 3\frac{11}{12} \\ -\ 2\frac{11}{12} = 2\frac{11}{12} \\ \hline \end{array}$ b. $\begin{array}{r} 9\frac{1}{8} = 8\frac{11}{8} \\ -\ 2\frac{7}{8} = 2\ \frac{7}{8} \\ \hline \end{array}$ c. $\begin{array}{r} 4\frac{5}{8} = 4\frac{5}{8} \\ -\ 2\frac{3}{4} = 2\frac{7}{8} \\ \hline \end{array}$

52. Do each problem in Exercise 51 correctly.

53. Jim brought home 3 quarts of milk. At the next meal the family drank $1\frac{1}{4}$ quarts. How much milk was left?

54. Mrs. Helm had $2\frac{3}{4}$ cups of milk. She used 7/8 of a cup to make a batch of waffles. How much milk did she have left?

55. Mr. Schultz has a board $4\frac{1}{2}$ feet long. If he cuts off a piece $1\frac{3}{4}$ feet long, what will be the length of the piece that is left?

56. Henry weighs $124\frac{1}{4}$ pounds and Bill weighs $119\frac{3}{4}$ pounds. How many more pounds heavier is Henry than Bill?

57. Frank's record in the high jump is $37\frac{1}{2}$ inches. George's record is $29\frac{3}{4}$ inches. How much higher can Frank jump than George?

58. The distance through the center of a basketball is $9\frac{3}{4}$ inches. The distance through the center of a baseball is $2\frac{7}{8}$ inches. How much greater is the distance through the center of a basketball than through the center of a baseball?

59. A golf ball measures $1\frac{11}{16}$ inches through the center. How much greater is the distance through the center of a baseball?

60. Normal body temperature is $98\frac{6}{10}^\circ$. In each case below find how much above normal or below normal each temperature is:

a. 105° c. $100\frac{3}{10}^\circ$ e. $98\frac{1}{10}^\circ$

b. $101\frac{7}{10}^\circ$ d. $99\frac{4}{10}^\circ$ f. 98°

61. What is the weight of the blood in a person weighing 90 pounds if the blood weighs about 1/15 of a person's weight?

62. What is the weight of the blood in your body?

63. A box of apples weighs $49\frac{1}{2}$ pounds. The empty box weighs $2\frac{1}{2}$ pounds. How much do the apples weigh?

64. Mary has a picture that is $\frac{11}{16}$ of an inch long and $\frac{3}{8}$ of an inch wide. How much more is its length than width?

65. Ben jumped $5\frac{1}{4}$ feet in the high jump in a track meet. Bob jumped $6\frac{1}{8}$ feet. How much higher did Bob jump than Ben?

66. Henry ran the 50-yard dash in $8\frac{3}{4}$ seconds. Frank ran it in $7\frac{1}{4}$ seconds. How much less time did it take Frank to run the dash than Henry?

67. When Jim left for summer camp he weighed $126\frac{3}{4}$ pounds. When he came back from camp he weighed $128\frac{1}{2}$ pounds. How much did he gain?

68. Mary is $48\frac{3}{4}$ inches tall, and Judy is $42\frac{1}{2}$ inches tall. How many inches taller is Mary than Judy?

69. James walked a mile in $22\frac{1}{2}$ minutes. Harold walked a mile in 27 minutes. How much longer did it take Harold than James?

70. John can throw a ball $31\frac{1}{3}$ feet. Harold can throw it 35 feet. How much farther can Harold throw the ball than John?

71. Mr. Simmons caught a 2-pound trout. His son Jimmy caught a $1\frac{3}{4}$-pound trout. How much more did Mr. Simmons' fish weigh than Jimmy's?

72. Ed swam a distance of 20 feet in a pool. Joe swam only $16\frac{1}{2}$ feet. How much farther did Ed swim than Joe?

J. Multiplication of Fractions (No Cancellation)

(SUGGESTIONS FOR TEACHING ASSIGNMENT 10)

This assignment covers multiplying a fraction or mixed number by a whole number. The most practical problems in multiplication of fractions occur in this area. Examples:

1. If steak costs $1.00 a pound, find the cost of $2\frac{1}{2}$ pounds of steak.

2. Find the cost of $\frac{3}{4}$ of a yard of ribbon at 16¢ a yard.

To show the meaning of multiplication of a whole number and a fraction use the following examples:

7 x 2 books = 14 books
3 x 5 baseballs = 15 baseballs
4 x 3¢ = 12¢

2 x 2 fifths = 4 fifths
3 x 2 ninths = 6 ninths
5 x 3 fourths = 15 fourths

The last three examples emphasize again the point that the denominator is the unit and when you multiply, the number of units change but the unit does not change. Convert the three problems above to the number form.

2 x 2 fifths = 4 fifths

$$2 \times \frac{2}{5} = \frac{4}{5}$$

3 x 2 ninths = 6 ninths

$$3 \times \frac{2}{9} = \frac{6}{9} = \frac{2}{3}$$

5 x 3 fourths = 15 fourths

$$5 \times \frac{3}{4} = \frac{15}{4} = 3\frac{3}{4}$$

Here is another place where answers have to be put in simplest form (proper fractions reduced to lowest terms and improper fractions changed to mixed numbers).

Do several more examples at the blackboard:

$$5 \times \frac{1}{6} = \frac{5}{6} \qquad 4 \times \frac{5}{6} = \frac{20}{6} = 3\frac{2}{6} = 3\frac{1}{3}$$

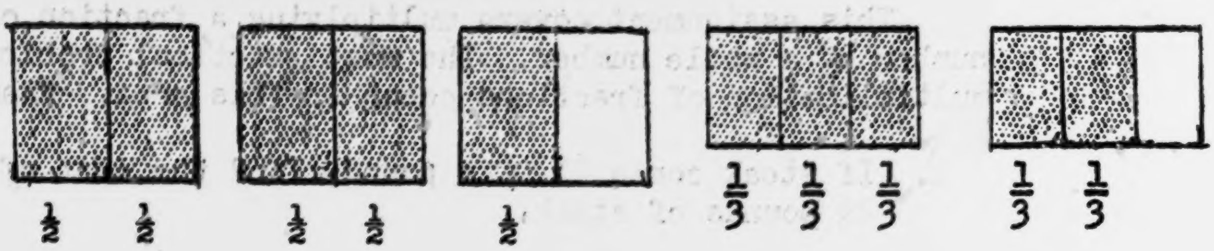
$$6 \times \frac{1}{2} = \frac{6}{2} = 3 \qquad 7 \times \frac{7}{8} = \frac{49}{8} = 6\frac{1}{8}$$

To multiply a fraction by a whole number, multiply the numerator by the whole number and divide the product by the denominator.

In addition and subtraction of fractions, the students learned how to change improper fractions to mixed numbers.

$$\begin{array}{r} \frac{2}{3} \\ + \frac{2}{3} \\ \hline \frac{4}{3} = 1\frac{1}{3} \end{array} \qquad \begin{array}{r} 7 = 6\frac{8}{8} \\ - 2\frac{3}{8} = 2\frac{3}{8} \\ \hline 4\frac{5}{8} \end{array}$$

The next step in multiplication of fractions (mixed number times a whole number) involves the opposite procedure, that is changing a mixed number to an improper fraction. Again use visual materials to show the relationship.



$1 + 1 + \frac{1}{2} = 2\frac{1}{2}$ $\qquad$ $1 + \frac{2}{3} = 1\frac{2}{3}$

$\frac{2}{2} \div \frac{2}{2} + \frac{1}{2} = \frac{5}{2}$ $\qquad$ $\frac{3}{3} + \frac{2}{3} = \frac{5}{3}$

$2\frac{1}{2} = \frac{5}{2}$ $\qquad$ $1\frac{2}{3} = \frac{5}{3}$

Do several more examples until each pupil discovers the meaning of the process. The pupil then will see that to change $7\frac{2}{3}$ to an improper fraction you change the whole number 7 to thirds.

$7 \times \frac{3}{3} = \frac{21}{3}$ and add the $\frac{2}{3}$ $\left(\frac{21}{3} + \frac{2}{3} = \frac{23}{3}\right)$.

Do a number of examples before assigning problems.

$2\frac{1}{8} = \frac{17}{8}$ $\qquad$ $3\frac{3}{5} = \frac{18}{5}$ $\qquad$ $1\frac{5}{6} = \frac{11}{6}$

$6\frac{4}{5} = \frac{34}{5}$ $\qquad$ $2\frac{2}{3} = \frac{8}{3}$ $\qquad$ $1\frac{3}{4} = \frac{7}{4}$

We now combine these two items together (multiplication of a fraction by a whole number and changing mixed numbers to improper fractions), and do one of the very practical problems in multiplication of fractions - a whole number times a mixed number. Example:

John drives $4\frac{5}{10}$ miles to work. How far does he drive in a day?

There are two ways to do the problem:

$4\frac{5}{10}$ $\qquad$ $4\frac{5}{10} \times 2$

$\underline{\times\ 2}$

$1\ (2 \times \frac{5}{10})$ $\qquad$ $\frac{45}{10} \times 2 = \frac{90}{10} = 9$

$\underline{8\ (2 \times\ 4)}$

9

For students in Basic Mathematics the second form is the preferred form. The steps are:

1. Change the mixed number to an improper fraction.
2. Multiply the fraction by the whole number.

Put these examples on the blackboard and work out in detail:

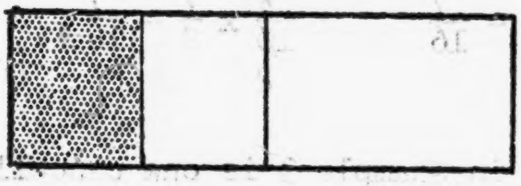
$1\frac{3}{4} \times 8$ $\qquad 5\frac{3}{4} \times 4$ $\qquad 5 \times 8\frac{1}{2}$

$8\frac{1}{2} \times 5$ $\qquad 4 \times 6\frac{1}{4}$ $\qquad 6 \times 4\frac{1}{3}$

K. Multiplication of Fractions (Cancellation)

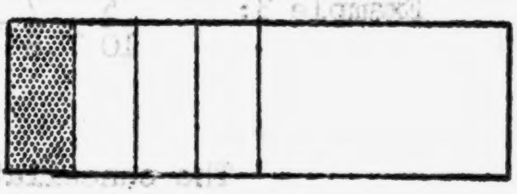
(SUGGESTIONS FOR TEACHING ASSIGNMENT 11)

The social applications of multiplying a fraction by a fraction are limited, but the computation work is not difficult. The best procedure is to show by diagrams that the products are correct. Use the following examples:



$\frac{1}{2}$ of $\frac{1}{2} = \frac{1}{4}$

$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$



$\frac{1}{4}$ of $\frac{1}{2} = \frac{1}{8}$

$\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$

The student catches on very quickly that the answers can be obtained by multiplying the numerators and then multiplying the denominators. Do the following examples on the blackboard:

$\frac{1}{3} \times \frac{4}{5}$ $\qquad \frac{2}{3} \times \frac{1}{3}$ $\qquad \frac{2}{3} \times \frac{3}{5}$

$\frac{3}{4} \times \frac{1}{2}$ $\qquad \frac{3}{4} \times \frac{1}{4}$ $\qquad \frac{2}{5} \times \frac{1}{2}$

Up to this point the process of cancellation has not been mentioned. Cancellation is a convenience, not a necessity. If the teacher feels that the students can cancel correctly, then use cancellation. In using cancellation emphasize these points:

1. In cancelling, you are reducing the fractions to lowest terms before multiplying.

2. The basic principle applied is that both numerator and denominator of a fraction may be divided by the same number without changing the value of the fraction.

3. Instead of using the term "cancellation", the expression "divide before you multiply" could be used.

In explaining cancellation, show that you get the same answer whether you cancel or not, and if there is more than one possible cancellation, which one you perform does not affect the answer.

Example 1: No cancellation $\frac{2}{3} \times \frac{1}{4} = \frac{2}{12} = \frac{1}{6}$

Cancellation $\frac{\overset{1}{\cancel{2}}}{3} \times \frac{1}{\underset{2}{\cancel{4}}} = \frac{1}{6}$

Example 2: $\frac{3}{4} \times \frac{2}{6} = \frac{6}{24} = \frac{1}{4}$ $\quad \frac{\overset{1}{\cancel{3}}}{\underset{2}{\cancel{4}}} \times \frac{\overset{1}{\cancel{2}}}{\underset{2}{\cancel{6}}} = \frac{1}{4}$ $\quad \frac{\overset{1}{\cancel{3}}}{4} \times \frac{\overset{1}{\cancel{2}}}{\underset{\underset{1}{\cancel{2}}}{\cancel{6}}} = \frac{1}{4}$

Example 3: $\frac{5}{10} \times \frac{7}{8} = \frac{35}{80} = \frac{7}{16}$ $\quad \frac{\overset{1}{\cancel{5}}}{\underset{2}{\cancel{10}}} \times \frac{7}{8} = \frac{7}{16}$

The cancellation in Example 3 is one cancellation that many students miss.

Examples of fractions and mixed numbers should be explained before starting Assignment 11:

$5\frac{1}{2} \times \frac{1}{4}$ $\quad \frac{1}{5} \times 3\frac{1}{3}$ $\quad 2\frac{1}{2} \times 4\frac{2}{4}$

$\frac{11}{2} \times \frac{1}{4} = \frac{11}{8} = 1\frac{3}{8}$ $\quad \frac{1}{\underset{1}{\cancel{5}}} \times \frac{\overset{2}{\cancel{10}}}{3} = \frac{2}{3}$ $\quad \frac{5}{\underset{1}{\cancel{2}}} \times \frac{\overset{9}{\cancel{18}}}{4} = \frac{45}{4} = 11\frac{1}{4}$

ASSIGNMENT 10

Multiply:

1. $4 \times \frac{3}{8}$ 2. $7 \times \frac{1}{4}$ 3. $2 \times \frac{2}{5}$ 4. $6 \times \frac{1}{6}$ 5. $\frac{1}{6} \times 12$ 6. $\frac{1}{8} \times 4$

7. $\frac{3}{10} \times 6$ 8. $\frac{3}{4} \times 8$ 9. $2 \times \frac{5}{6}$ 10. $9 \times \frac{1}{9}$ 11. $\frac{3}{4} \times 7$ 12. $\frac{1}{6} \times 18$

13. $8 \times \frac{3}{8}$ 14. $12 \times \frac{2}{3}$ 15. $\frac{1}{8} \times 16$ 16. $\frac{7}{8}$ of 4 17. $\frac{2}{5}$ of 9

18. $12 \times \frac{1}{2}$ 19. $\frac{3}{4}$ of 12 20. $\frac{1}{4}$ of 8

Change the following mixed numbers to improper fractions:

21. $9\frac{3}{4}$ 22. $3\frac{1}{7}$ 23. $8\frac{3}{8}$ 24. $10\frac{5}{6}$ 25. $5\frac{2}{5}$ 26. $3\frac{1}{9}$

27. $7\frac{2}{3}$ 28. $6\frac{1}{6}$ 29. $1\frac{7}{8}$ 30. $2\frac{3}{5}$ 31. $4\frac{3}{4}$ 32. $3\frac{1}{3}$

Multiply:

33. $3 \times 2\frac{1}{5}$ 34. $2 \times 2\frac{3}{4}$ 35. $3 \times 3\frac{1}{3}$ 36. $6 \times 2\frac{1}{2}$

37. $1\frac{1}{6} \times 8$ 38. $2\frac{1}{4} \times 3$ 39. $3\frac{1}{2} \times 4$ 40. $2\frac{1}{4} \times 12$

41. $9 \times 4\frac{1}{2}$ 42. $6 \times 2\frac{1}{4}$ 43. $6 \times 3\frac{1}{3}$ 44. $6\frac{2}{3} \times 2$

45. $2\frac{1}{2} \times 8$ 46. $4 \times 2\frac{1}{8}$ 47. $6 \times 4\frac{1}{6}$ 48. $1\frac{1}{3} \times 5$

49. $4\frac{1}{4} \times 2$ 50. $4 \times 2\frac{1}{3}$

51. Mrs. Levin made 4 dozen cookies. She put frosting on $\frac{1}{2}$ of them. How many cookies did she put frosting on?

52. Steak costs 90¢ a pound. How much would you pay for $2\frac{1}{2}$ pounds?

53. The average annual rainfall in the United States is 32 inches. How much rain do they have in a tropical region where they have $3\frac{1}{2}$ times this amount?

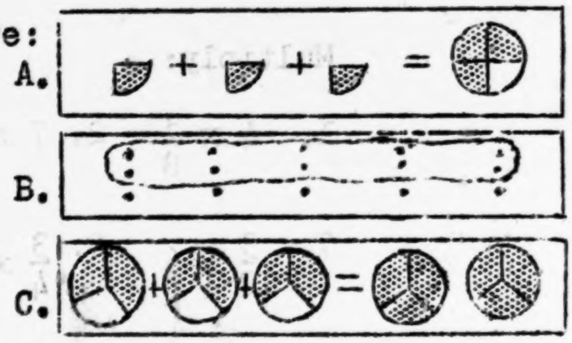
54. Helen made 8 aprons. Each apron required $\frac{1}{2}$ yard of material. How much material did she use?

55. Jim bought 2 dozen doughnuts at the bakery. On the way home he ate 1/3 of them. How many did he eat? How many were left?

56. Mr. Strong rides the bus to work each day. He makes 10 trips each week, and each trip takes 3/4 of an hour. How many hours does he ride the bus each week?

57. Match the statement with the picture:

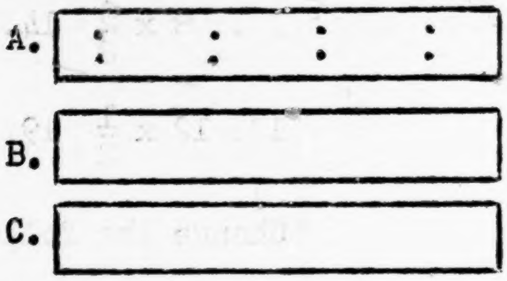
1. $\frac{2}{3} \times 15 = 10$
2. $3 \times \frac{2}{3} = 2$
3. $3 \times \frac{1}{4} = \frac{3}{4}$



58. Make the following drawings:

A. In Box B draw $\frac{1}{4}$ as many dots as there are in Box A.

B. In Box C draw $1\frac{1}{2}$ as many dots as there are in Box A.



59. Do this as a multiplication problem:

$$\frac{2}{3} + \frac{2}{3} + \frac{2}{3} + \frac{2}{3}$$

60. Which is more, $\frac{5}{6}$ of 42 or $\frac{7}{8}$ of 40?

ASSIGNMENT 11

1. $\frac{2}{5} \times \frac{5}{8}$ 2. $\frac{1}{2} \times \frac{1}{3}$ 3. $\frac{3}{4} \times \frac{5}{6}$ 4. $\frac{1}{4} \times \frac{1}{3}$ 5. $\frac{2}{3} \times \frac{2}{3}$

6. $\frac{3}{4} \times \frac{2}{5}$ 7. $\frac{1}{2} \times \frac{5}{6}$ 8. $\frac{2}{5} \times \frac{1}{2}$ 9. $\frac{3}{4} \times \frac{3}{4}$ 10. $\frac{3}{4} \times \frac{1}{3}$

11. $\frac{3}{8} \times \frac{1}{2}$ 12. $\frac{3}{4} \times \frac{2}{3}$ 13. $\frac{1}{9} \times \frac{3}{10}$ 14. $\frac{2}{5} \times \frac{1}{8}$ 15. $\frac{5}{8} \times \frac{4}{5}$

16. $\frac{3}{4} \times \frac{1}{9}$ 17. $\frac{7}{8} \times \frac{7}{8}$ 18. $\frac{3}{10} \times \frac{5}{18}$ 19. $\frac{2}{3} \times \frac{12}{16}$ 20. $\frac{3}{10} \times \frac{5}{27}$

21. $\frac{7}{10} \times \frac{2}{14}$ 22. $\frac{8}{9} \times \frac{3}{4}$ 23. $\frac{2}{3} \times \frac{3}{6}$ 24. $\frac{5}{12} \times \frac{3}{10}$ 25. $3\frac{1}{2} \times \frac{1}{2}$

26. $\frac{3}{8} \times 3\frac{1}{5}$ 27. $7\frac{1}{2} \times \frac{2}{3}$ 28. $\frac{3}{8} \times 5\frac{1}{3}$ 29. $1\frac{1}{4} \times \frac{2}{3}$ 30. $\frac{1}{4} \times 1\frac{1}{2}$

31. $4\frac{4}{5} \times 1\frac{1}{2}$ 32. $2\frac{1}{2} \times 2\frac{5}{6}$ 33. $2\frac{1}{4} \times 2\frac{2}{3}$ 34. $1\frac{2}{3} \times 2\frac{2}{5}$ 35. $1\frac{1}{5} \times 1\frac{1}{4}$

36. $1\frac{1}{2} \times 2\frac{1}{4}$

37. There are 30 students in a Basic Mathematics class. If $\frac{3}{5}$ of the class are girls, how many girls are in the class?

38. In Problem 37, how many boys are in the class?

39. The following is a recipe for making gingerbread:
$\frac{1}{2}$ cup butter
1 cup sugar
2 eggs
$\frac{1}{2}$ cup molasses
$\frac{1}{2}$ cup boiling water
2 cups flour
$1\frac{1}{2}$ tsp. ginger
1 tsp. nutmeg
$\frac{1}{2}$ tsp. salt
2 tsp. soda
It will make 8 servings. Rewrite the recipe to make 4 servings (take $\frac{1}{2}$ of each ingredient).

40. In each problem below circle the mistake:

a. $24 \text{ x } \frac{2}{3} = \frac{48}{3} = 17$

c. $\dfrac{\overset{1}{\cancel{2}}}{\underset{1}{\cancel{8}}} \text{ x } \dfrac{\overset{2}{\cancel{24}}}{\underset{3}{\cancel{9}}} = \dfrac{2}{3}$

b. $\frac{3}{4} \text{ x } \frac{5}{1} = \frac{15}{5} = 3$

d. $\dfrac{\cancel{5}}{\underset{2}{\cancel{8}}} \text{ x } \dfrac{\cancel{4}}{\underset{2}{1\cancel{0}}} = 4$

41. Do each problem in Exercise 40 correctly.

42. If oranges cost 39¢ a dozen, how much will Mrs. Smith pay for 8 oranges?

43. If you sleep $\frac{1}{3}$ of every day, how many hours do you sleep in a day?

44. Today's modern trains on a long run travel $4\frac{1}{2}$ times as fast as the old trains. If the old trains travelled at the rate of 15 miles an hour, how fast does a modern train travel on a long run?

45. Mrs. O'Shea bought a $5\frac{1}{2}$-pound rib roast. The O'Shea family ate 1/3 of it at supper. How much did they eat at supper and how much was there for "left-overs"?

46. Jim Henry brought home a 20-pound watermelon. The family ate 3/4 of it immediately. How many pounds did they eat, and how many pounds were left?

47. Helen had 16 pencils. She lost 3/4 of them. How many did she lose?

48. Charles received $10.00 for his birthday. He spent $\frac{1}{4}$ of it. How much did he spend? How much did he have left?

49. Mr. Small's fuel oil tank holds 250 gallons of oil. If the tank is $\frac{1}{2}$ full, how many gallons are in the tank?

50. Walter walks 3/10 of a mile in going to and from school each day. How far does he walk in 5 days?

51. Kevin's father worked 3/5 of an hour on a crossword puzzle. How many minutes was that?

52. To wallpaper a room in his home Mr. Carroll used 6 strips of wallpaper. Each strip was $6\frac{1}{3}$ feet long. How much wallpaper did he need?

53. When you cancel you are______________before you multiply.

54. Mrs. Nelson needs $1\frac{1}{3}$ times as much material for a long-sleeved blouse as for one with short sleeves. If a short-sleeved blouse uses $1\frac{1}{2}$ yards, how many yards does she need for a long-sleeved blouse?

55. Mrs. Paar ordered $3\frac{1}{2}$ dozen eggs. How many eggs did she get?

56. Lillian had 90¢. She spent 1/3 of it for lunch. How much did she spend for lunch?

57. A yard of material costs $1.80. How much will 2/3 of a yard cost?

58. There were 72 words on a spelling test. Daniel spelled 7/8 of them correctly. How many words did he spell correctly?

59. The income of the Nelson family last year was $7,200. They saved 1/12 of it. How much did they save?

60. Sometimes paper money gets ripped or torn. The rule of the Treasury Department is that if you have as much as 2/5 of the bill, you can collect $\frac{1}{2}$ of the value of the bill. That is, if you found 2/5 of a dollar bill, the Treasury Department would give you $\frac{1}{2}$ the value, or 50¢. Find the amount you would get if you found 2/5 of each of the following bills: (a) $2.00; (b) $5.00; (c) $10.00; (d) $50.00; (e) $100.00; (f) $10,000.00.

61. How much did Jack pay for 3/4 of a pound of candy that costs 72 cents a pound?

62. In Chicago, 3/4 of the days during a 52-day summer period had some sunshine. On how many days was there sunshine?

63. The moon is smaller than the earth and so it has less gravity. You would weigh only 1/6 as much on the moon as you do on earth. If you weigh 90 pounds on the earth, you would weigh

$$\frac{1}{6} \text{ of } 90 \text{ or } \frac{1}{6} \times 90 = \frac{1}{\cancel{6}} \times \frac{\overset{15}{\cancel{90}}}{1} = 15 \text{ pounds on the moon.}$$

Find the weight of each of these people if they were sent to the moon:

a. Joe, 120 pounds
c. Harry, 150 pounds
b. Mary, 96 pounds
d. Jean, 84 pounds

64. How much would you weigh on the moon?

65. A camel travels about $2\frac{1}{2}$ miles in an hour with a heavy load on his back. How many miles can he travel in 5 hours?

L. Division of Fractions

(SUGGESTIONS FOR TEACHING ASSIGNMENT 12)

Division is the most difficult operation to master in the work with fractions, as it is with whole numbers.

From whole numbers we learned that division indicates how many times one number is contained in another. Examples:

$3\overline{)6}$ asks "How many 3's are in 6?"

$24\overline{)96}$ asks "How many 24's in 96?"

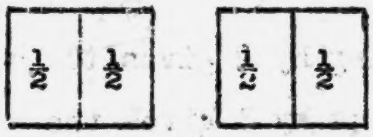
In fractions the question is the same.

$2 \div \frac{1}{2}$ asks "How many halves are in 2?"

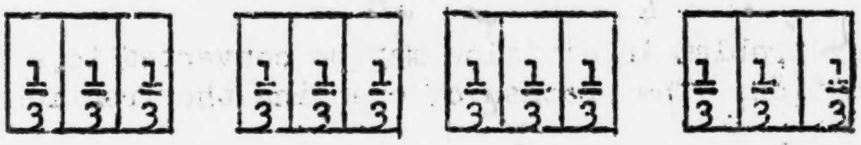
$4 \div \frac{1}{3}$ asks "How many thirds are in 4?"

$3 \div \frac{1}{4}$ asks "how many fourths are in 3?"

Answer each of these questions by placing diagrams on the blackboard to illustrate each problem:

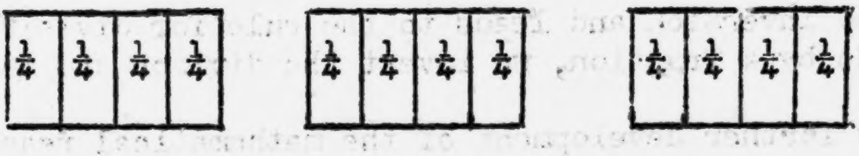


$2 \div \frac{1}{2} = 4$ There are 4 halves in 2.



$4 \div \frac{1}{3} = 12$

There are 12 thirds in 4.



$3 \div \frac{1}{4} = 12$

There are 12 fourths in 3.

In Assignment 12 the student is asked to obtain the answers to the division problems by reading and interpreting the diagrams. If the student can work these problems accurately, then the next section on the rule for division of fractions will be more meaningful.

M. Rule for Division of Fractions

(SUGGESTIONS FOR TEACHING ASSIGNMENT 13)

Take some of the examples from Section L or from Assignment 12 and use them to develop the rule for division of fractions. Examples:

$2 \div \frac{1}{2} = 4 \qquad 4 \div \frac{1}{3} = 12 \qquad 3 \div \frac{1}{4} = 12$

The answers to these problems were obtained by diagrams, but the students should make the following observations in each problem:

$2 \div \frac{1}{2} = 4$

In 1 there are 2 halves.
In 2 there are 2 x 2 halves, or 4 halves.

$4 \div \frac{1}{3} = 12$

In 1 there are 3 thirds.
In 4 there are 4 x 3 thirds or 12.

$3 \div \frac{1}{4} = 12$

In 1 there are 4 fourths
In 3 there are 3 x 4 fourths, or 12.

Make the following observations:

Dividing by $\frac{1}{2}$ and multiplying by 2 gives the same result.

Dividing by $\frac{1}{3}$ and multiplying by 3 gives the same result.

Dividing by $\frac{1}{4}$ and multiplying by 4 gives the same result.

Every problem in division may be converted to a problem in multiplication. The process of changing the fractions

$\frac{1}{2}$ to 2 $\qquad \frac{1}{3}$ to 3 $\qquad \frac{1}{5}$ to 5

is called inversion and leads to the rule for division of fractions: To divide by a fraction, we invert the divisor and multiply.

Any further development of the mathematical reason for inverting the divisor is undoubtedly beyond the comprehension of the students in Basic Mathematics.

In the problems below are examples of the different division problems. Work each example on the blackboard before assigning the problems indicated in Assignment 13.

1. $\frac{9}{10} \div \frac{3}{5}$

$\frac{\overset{3}{\cancel{9}}}{\underset{2}{\cancel{10}}} \times \frac{\overset{1}{\cancel{5}}}{\underset{1}{\cancel{3}}} = \frac{3}{2} = 1\frac{1}{2}$

(Problems #1-10)

2. $\frac{5}{6} \div 3\frac{3}{4}$

$\frac{5}{6} \div \frac{15}{4}$

$\frac{\overset{1}{\cancel{5}}}{\underset{3}{\cancel{6}}} \times \frac{\overset{2}{\cancel{4}}}{\underset{3}{\cancel{15}}} = \frac{2}{9}$

(Problems #11-15)

3. $4\frac{1}{2} \div \frac{3}{4}$

$\frac{9}{2} \div \frac{3}{4}$

$\frac{\overset{3}{\cancel{9}}}{\underset{1}{\cancel{2}}} \times \frac{\overset{2}{\cancel{4}}}{\underset{1}{\cancel{3}}} = \frac{6}{1} = 6$

(Problems #16-20)

4. $3\frac{3}{4} \div 1\frac{1}{4}$

$\frac{15}{4} \div \frac{5}{4}$

$\frac{\overset{3}{\cancel{15}}}{\underset{1}{\cancel{4}}} \times \frac{\overset{1}{\cancel{4}}}{\underset{1}{\cancel{5}}} = \frac{3}{1} = 3$

(Problems #21-25)

5. $\frac{1}{3} \div 4$

$\frac{1}{3} \div \frac{4}{1}$

$\frac{1}{3} \times \frac{1}{4} = \frac{1}{12}$

(Problems #26-30)

6. $4\frac{3}{4} \div 2$

$\frac{19}{4} \div \frac{2}{1}$

$\frac{19}{4} \times \frac{1}{2} = \frac{19}{8} = 2\frac{3}{8}$

(Problems #31-35)

7. $7 \div \frac{1}{2}$

$\frac{7}{1} \div \frac{1}{2}$

$\frac{7}{1} \times \frac{2}{1} = \frac{14}{1} = 14$

(Problems #36-40)

8. $6 \div 4\frac{1}{2}$

$\frac{6}{1} \div \frac{9}{2}$

$\frac{\overset{2}{\cancel{6}}}{1} \times \frac{2}{\underset{3}{\cancel{9}}} = \frac{4}{3} = 1\frac{1}{3}$

(Problems #41-44)

N. Review of Fractions

(SUGGESTIONS FOR TEACHING ASSIGNMENT 14)

The students in Basic Mathematics need a considerable amount of review work as the unit progresses. The numerical problems are mixed in Assignment 14, so the student has to be careful to perform the correct operation.

O. Review

(SUGGESTIONS FOR TEACHING ASSIGNMENT 15)

The problems in this assignment are intended to review all the work of Basic Mathematics I and the unit on fractions just completed.

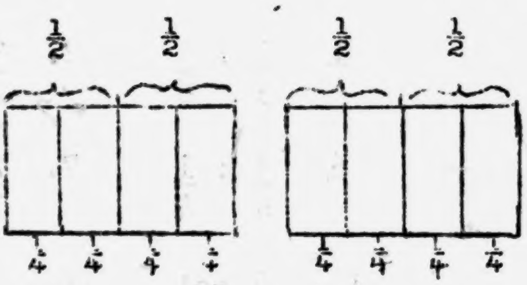
P. Activities

(SUGGESTIONS FOR TEACHING ASSIGNMENT 16)

The activities in Assignment 16 are intended to give more review of fractions by means of interesting materials.

ASSIGNMENT 12

1. Using the illustration at the right, answer the following questions:



   a. How many halves in one whole?
   b. How many fourths in one whole?
   c. How many halves in two wholes?
   d. How many fourths in two wholes?

2. Obtain the answers for each of these from Problem 1:

   a. $1 \div \frac{1}{2}$ b. $1 \div \frac{1}{4}$ c. $2 \div \frac{1}{2}$ d. $2 \div \frac{1}{4}$

3. With your ruler draw a line 4 inches long. From this line answer the following questions:

   a. How many half inches are there in 4 inches?
   b. How many quarter inches are there in 4 inches?
   c. How many eighth inches are there in 4 inches?

4. Obtain the answers for each of these from Problem 3:

   a. $4 \div \frac{1}{2}$ b. $4 \div \frac{1}{4}$ c. $4 \div \frac{1}{8}$

5. So that everyone would have enough to eat at a picnic, Helen cut each of six sandwiches in half.

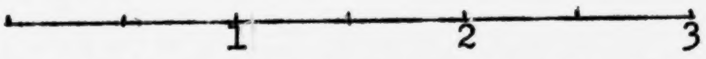
   a. Make a drawing to show what Helen did.
   b. How many half-sandwiches were there?
   c. If there were four people eating the sandwiches, how many halves did each one get?

6. Using your ruler find:

   a. How many halves in 3? $(3 \div \frac{1}{2} = ?)$
   b. How many fourths in 2? $(2 \div \frac{1}{4} = ?)$
   c. How many eighths in 5? $(5 \div \frac{1}{8} = ?)$

7. Make a drawing to show there are six halves in 3. $(3 \div \frac{1}{2} = 6)$

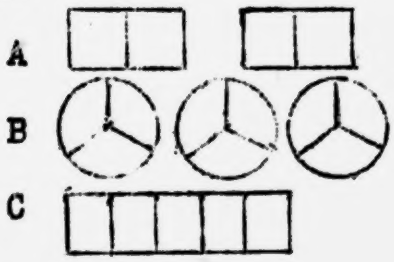
8. The number line below shows how many halves there are in three. How many are there?



9. Make a number line to show how many fourths there are in 2.

10. Use the diagrams to obtain these answers:

    a. Diagram A shows $2 \div \frac{1}{2} =$ ___?___
    b. Diagram B shows $3 \div \frac{1}{3} =$ ___?___
    c. Diagram C shows $1 \div \frac{1}{5} =$ ___?___



ASSIGNMENT 13

1. $\frac{1}{3} \div \frac{5}{8}$ 2. $\frac{3}{4} \div \frac{2}{7}$ 3. $\frac{1}{5} \div \frac{1}{3}$ 4. $\frac{3}{4} \div \frac{1}{8}$ 5. $\frac{1}{2} \div \frac{1}{6}$

6. $\frac{3}{4} \div \frac{1}{4}$ 7. $\frac{2}{3} \div \frac{3}{5}$ 8. $\frac{3}{4} \div \frac{1}{2}$ 9. $\frac{1}{6} \div \frac{1}{2}$ 10. $\frac{1}{4} \div \frac{1}{8}$

11. $\frac{5}{8} \div 2\frac{1}{2}$ 12. $\frac{1}{5} \div 1\frac{1}{3}$ 13. $\frac{2}{5} \div 1\frac{1}{3}$ 14. $\frac{1}{2} \div 1\frac{1}{6}$ 15. $\frac{2}{3} \div 1\frac{2}{7}$

16. $12\frac{1}{2} \div \frac{1}{2}$ 17. $3\frac{5}{6} \div \frac{1}{4}$ 18. $5\frac{1}{2} \div \frac{2}{5}$ 19. $6\frac{7}{8} \div \frac{3}{4}$ 20. $3\frac{3}{4} \div \frac{1}{8}$

21. $8\frac{1}{4} \div 5\frac{1}{2}$ 22. $10\frac{1}{2} \div 1\frac{1}{2}$ 23. $3\frac{2}{8} \div 2\frac{1}{4}$ 24. $2\frac{3}{4} \div 4\frac{1}{2}$

25. $13\frac{1}{2} \div 2\frac{1}{4}$ 26. $\frac{1}{4} \div 2$ 27. $\frac{3}{4} \div 6$ 28. $\frac{7}{8} \div 7$ 29. $\frac{3}{8} \div 2$

30. $\frac{2}{5} \div 3$ 31. $4\frac{3}{4} \div 3$ 32. $9\frac{1}{2} \div 2$ 33. $7\frac{3}{5} \div 4$ 34. $6\frac{7}{8} \div 5$

35. $2\frac{1}{4} \div 3$ 36. $4 \div \frac{5}{8}$ 37. $3 \div \frac{3}{4}$ 38. $8 \div \frac{1}{2}$ 39. $3 \div \frac{1}{8}$

40. $12 \div \frac{2}{10}$ 41. $10 \div 4\frac{1}{2}$ 42. $3 \div 3\frac{3}{4}$ 43. $3 \div 2\frac{1}{4}$ 44. $2 \div 1\frac{1}{8}$

45. **In each problem below circle the divisor:**

a. $\overset{3}{4\overline{)12}}$ b. $18 \div 9 = 2$ c. $5 \div \frac{1}{2} = 10$ d. $2\frac{1}{2} \div \frac{1}{4} = 10$

46. **What is the mistake in this problem:** $\frac{8}{9} \div \frac{1}{2} = \frac{\overset{4}{\cancel{8}}}{9} \times \frac{1}{\underset{1}{\cancel{2}}} = \frac{4}{9}$?

47. **At breakfast Mrs. Jones cut 3 grapefruits in half and gave each person $\frac{1}{2}$ grapefruit. How many people can she serve?**

48. **How many towels $\frac{1}{2}$ yard long can Josephine make from 7 yards of toweling?**

49. Write each whole number as a fraction with a denominator 1:

7 4 9 5 3

50. Invert each answer in Problem 49.

51. For a party Julie made 8 quarts of fruit punch and served it in cups each holding 1/8 quart. How many cups of fruit punch could she serve?

52. Hot dogs are packaged 8 in a package. What part of a dozen is in each package?

53. Invert each of these fractions: $\frac{3}{4}$ $\frac{5}{6}$ $\frac{8}{7}$ $\frac{13}{9}$

54. Tom and Jim have 3/4 of a candy bar to divide equally. What part of a candy bar will each boy get?

55. A board $4\frac{1}{2}$ feet long was cut into 3 equal pieces. What was the length of each piece?

56. A board is 5/8 inch thick. How many boards will make a stack 15 inches high?

57. Steve cut a $10\frac{1}{2}$-foot board into pieces $1\frac{3}{4}$ feet in length. How many pieces of wood did he get?

58. In the month of April there are 30 days. When broken down into weeks, this would be 4 full weeks and 2 days left over. The 2 days would be 2/7 of a week. So in April there are $4\frac{2}{7}$ weeks.

Fill in the table below for the other months:

Month	Number of Days	Number of Weeks
May		
June		
August		
November		

ASSIGNMENT 14

1. In the fraction 2/3, the 2 is the __________ and the 3 is the __________.

2. After each fraction write its correct name:

a. $\frac{5}{3}$ ____________________ c. $1\frac{2}{3}$ ____________________

b. $\frac{7}{1}$ ____________________ d. $\frac{3}{4}$ ____________________

3. At 80¢ a pound, how much does 3/4 of a pound of hamburger cost?

4. It is $1\frac{3}{4}$ miles from Jack's house to the park. What is the distance back and forth from the park?

5. Write a division that tells:

   a. How many flags each $\frac{1}{4}$ yard long you can get from 2 yards of cloth?

   b. How long will each flag be if you make 8 flags out of 4 yards of material?

6. At Thanksgiving Mrs. Beam bought a $10\frac{1}{2}$-pound turkey. If she allows 3/4 pound to each person, how many can she serve?

7. Joe watched television $1\frac{3}{4}$ hours in the afternoon and $3\frac{1}{2}$ hours that evening. How long did he watch television that day?

8. Helen had 6 pounds of candy to put into bags of $\frac{1}{4}$ pound each. How many bags of candy can she fill?

9. Fill in the missing words:

   a. Before fractions can be added or subtracted, they must have a __________ __________.

   b. You can __________ the numerator and denominator of a fraction by the same number without changing its value.

   c. $1\frac{2}{3}$ is a __________ __________.

10. Which is larger in each pair?

    a. $\frac{2}{3}$ or $\frac{3}{4}$ b. $\frac{6}{10}$ or $\frac{1}{2}$ c. $\frac{3}{4}$ or $\frac{4}{5}$

11. $\begin{array}{r} 7\frac{5}{16} \\ +\ 8\frac{11}{16} \\ \hline \end{array}$

12. $\begin{array}{r} 5\frac{1}{6} \\ -\ 2\frac{5}{6} \\ \hline \end{array}$

13. $\begin{array}{r} 3\frac{1}{2} \\ +\ 5\frac{1}{4} \\ \hline \end{array}$

14. $\begin{array}{r} \frac{7}{8} \\ -\ \frac{3}{8} \\ \hline \end{array}$

15. $2 \times \frac{5}{6}$

16. $\frac{9}{10} \div 3$

17. $\frac{2}{3} \times 7\frac{1}{2}$

18. $4 \div \frac{1}{8}$

19. $\begin{array}{r} 7\frac{3}{4} \\ +\ 8\frac{5}{6} \\ \hline \end{array}$

20. $\begin{array}{r} 8 \\ -\ 3\frac{1}{3} \\ \hline \end{array}$

21. $\begin{array}{r} 5\frac{7}{8} \\ -\ 2\frac{1}{16} \\ \hline \end{array}$

22. $\begin{array}{r} 2\frac{1}{3} \\ +\ \frac{1}{4} \\ \hline \end{array}$

23. $3\frac{3}{4} \times 5\frac{2}{3}$

24. $\frac{1}{8} \div \frac{1}{3}$

25. $7\frac{5}{8} \times 24$

26. $8 \div \frac{2}{5}$

27. $\begin{array}{r} 64\frac{3}{4} \\ +\ 35\frac{5}{6} \\ \hline \end{array}$

28. $\begin{array}{r} 3\frac{3}{8} \\ -\ 1\frac{1}{2} \\ \hline \end{array}$

29. $\begin{array}{r} 5\frac{5}{8} \\ +\ 2\frac{1}{4} \\ \hline \end{array}$

30. $\begin{array}{r} 12\frac{1}{8} \\ -\ 6\frac{1}{2} \\ \hline \end{array}$

31. $6\frac{2}{5} \times \frac{15}{16}$ 32. $3 \div \frac{3}{4}$ 33. $\frac{7}{12} \times \frac{5}{8}$ 34. $7\frac{2}{3} \div 3$

35. $4\frac{7}{8}$
$+ 6\frac{3}{4}$

36. $6\frac{3}{4}$
$+ 5\frac{1}{2}$

37. $8\frac{1}{4}$
$- \frac{5}{12}$

38. $9\frac{1}{8}$
$- 8\frac{7}{8}$

39. $\frac{7}{8} \div 3\frac{1}{4}$

40. $\frac{5}{6} \div 15$ 41. $3\frac{3}{4} \times 1\frac{3}{10}$ 42. $\frac{5}{12} \times 60$

43. $3\frac{5}{8}$
$+ 7\frac{1}{2}$

44. 26
$- 19\frac{5}{12}$

45. $26\frac{5}{12}$
$- 19$

46. 26
$+ 19\frac{5}{12}$

47. $\frac{1}{8}$ of 72 48. $\frac{3}{5}$ of 65

49. $\frac{9}{16} \div \frac{3}{4}$ 50. $\frac{1}{4} \div \frac{1}{2}$

ASSIGNMENT 15

Solve the following review problems:

1. 443
572
+ 116

2. 208
− 168

3. 87
x 93

4. $19\overline{)1064}$

5. $63\overline{)\$68.67}$

6. $62.08
.53
9.27
+ 82.99

7. $60,000.00
− 5,672.49

8. $26.92
x 43

9. Henry earned $14.50 in a week in his after school job. He spent $2.50 for a hockey stick, $6.50 for skates and $1.95 for gloves. How much did he have left?

10. If you save $ .10 every day in the month of June, how much will you have at the end of the month?

11. 8769
6892
7541
7458
+ 6872

12. 3000
− 1628

13. 301
x 157

14. $21\overline{)1581}$

15. $61\overline{)1997}$

16. 79/52642

17. $7\frac{1}{6} - 4\frac{5}{6}$

18. $6\frac{5}{6} + 5\frac{5}{12}$

19. Jack Hanson drove from Chicago to Memphis, Tennessee, a distance of 598 miles. The car used 26 gallons of gasoline. What was the average number of miles per gallon?

20. Nature takes at least 500 years to make one inch of soil. How many years does it take nature to make 4 inches of soil?

21. Beside each number, write the correct name of that part of the problem:

7 addend
+ 3 ______
10 ______

12 ______
- 8 ______
4 ______

4 ______
x 9 ______
36 ______

11 ______
______ 6/66 ______

22. It took Jim Sloan from 2 P.M. to 7 P.M. to read a book of 160 pages. How many pages did he read each hour?

23. If it costs $3\frac{1}{3}$ cents an hour to use her electric iron, how much will it cost Mrs. Cook to iron for 3 hours?

24. If it takes 144 pennies to weigh a pound, how many pennies are there in 7 pounds? How much money is this?

25. The National Safety Council predicts that 40,000 will be killed in automobile accidents in the United States in 1959. There were 33,629 battle deaths in the Korean War. How many more people will be killed by automobiles in 1959 than lost their lives in the Korean War?

26. The daily circulation of Chicago newspapers as of March 31, 1958, was as follows:

American	477,250
Daily News	565,674
Sun-Times	539,090
Tribune	900,895

a. Which newspaper had the largest circulation?
b. Which newspaper had the smallest circulation?
c. How many more Tribunes were sold than Daily News?
d. How many more Sun-Times were sold than Americans?
e. How many fewer Sun-Times were sold than Daily News?
f. How many fewer Americans were sold than Sun-Times?

27. 5009 − 1269

28. 54/5130

29. 26/13208

30. $7.86 x 180

31. 8/$69.36

32. 48/242880

33. $9.80 − 1.89

34. $7.15 x 65

35. $\frac{1}{7} + \frac{3}{7}$　36. $\frac{3}{8} \times 24$　37. $6 \div \frac{3}{7}$　38. $7\frac{1}{3} - 3\frac{5}{6}$　39. $8\frac{3}{4} \div 5$

40. $2\frac{1}{4} \times 3\frac{1}{2}$　41. $8\frac{1}{5} - 3\frac{1}{2}$　42. $\begin{array}{r} 7 \\ -\ 2\frac{1}{2} \\ \hline \end{array}$　43. $\begin{array}{r} 7\frac{1}{2} \\ -\ 2 \\ \hline \end{array}$　44. $\begin{array}{r} 7\frac{1}{2} \\ +\ 2 \\ \hline \end{array}$

45. $\begin{array}{r} 7 \\ +\ 2\frac{1}{2} \\ \hline \end{array}$　46. $7 \times 2\frac{1}{2}$　47. $7 \div 2\frac{1}{2}$　48. $2\frac{1}{2} \div 7$　49. $2\frac{1}{2} \times 7$

50. $2\frac{1}{2} \div 9$

ASSIGNMENT 16

1. Fill in the puzzle with the correct numbers.

a		▨	b	▨	▨	c
	▨	d		▨	e	
▨	f		▨	g		▨
h		▨	i		▨	j
▨	▨	k		▨	l	
▨	m		▨	n		▨
o		▨	p		▨	▨

Across

a. $9\frac{1}{3} + 3\frac{2}{3}$

d. $4\frac{5}{8} - 2\frac{1}{4}$

e. $2\frac{7}{12} + \frac{1}{3} + 3\frac{1}{4}$

f. $9 - 3\frac{2}{5}$

g. $8\frac{5}{12} - 5\frac{3}{4}$

h. $\frac{1}{3} + \frac{1}{2} + \frac{1}{6} + \frac{5}{6}$

i. $9\frac{3}{8} - 5\frac{3}{4}$

k. $7\frac{5}{6} - 2\frac{1}{2}$

l. $5 - 2\frac{1}{4}$

m. $4\frac{1}{3} - 2\frac{5}{12}$

n. $2\frac{1}{3} + 3\frac{1}{4} + 1\frac{1}{2}$

o. $\frac{7}{16} + \frac{5}{8} + \frac{1}{4}$

p. $18\frac{7}{8} - 17\frac{1}{4}$

Down

a. $5\frac{3}{12} + 4\frac{3}{4}$

b. $\frac{1}{2} + \frac{1}{4} + \frac{5}{8}$

c. $2\frac{1}{2} - 1\frac{1}{3}$

d. $1\frac{1}{10} + 1\frac{1}{2}$

e. $2\frac{2}{9} + 3\frac{1}{3} + 1\frac{1}{9}$

f. $3\frac{2}{3} + 2\frac{1}{6}$

g. $3\frac{3}{8} - \frac{3}{4}$

i. $5 - 1\frac{2}{3}$

j. $\frac{11}{12} + \frac{5}{6}$

k. $2\frac{1}{6} + 3\frac{3}{4}$

l. $7\frac{1}{3} - 5\frac{1}{4}$

m. $2 - \frac{11}{16}$

n. $2\frac{1}{6} + 1\frac{1}{8} + 4\frac{1}{3}$

2. To find the missing numbers in the magic square add the numbers in the first row. All other rows and columns must have the same total.

$\frac{1}{2}$	$\frac{1}{16}$	$\frac{9}{16}$
	$\frac{3}{8}$	
		$\frac{1}{4}$

3. Fill in the puzzle with the correct numbers.

a	b	▨	c	d	▨	▨
e		▨	f		▨	g
▨	▨	h		▨	i	
j	k		▨	l		
m		▨	n		▨	▨
▨	▨	o		▨	p	q
▨	r			▨	s	

Across

a. $21\frac{1}{2} + 20\frac{1}{2}$

c. $157\frac{1}{2} - 126\frac{2}{4}$

e. $18 - 13\frac{1}{2}$

f. $2\frac{2}{3} + 2\frac{1}{6} + 1\frac{1}{2}$

h. $3 - \frac{1}{6}$

i. $21 \times 3\frac{2}{7}$

j. $\frac{5}{6} \times 29$

l. $10 \div \frac{4}{9}$

m. $17\frac{1}{2} \div 2\frac{1}{3}$

n. $5\frac{3}{5} + \frac{3}{10}$

o. $21 \div \frac{3}{7}$

p. $14 \div \frac{7}{12}$

r. $4\frac{1}{2} \times 8\frac{3}{4}$

2. $\frac{2}{3}$ of 10

a. $40\frac{3}{4} + 3\frac{2}{8}$

b. $1\frac{1}{8} + 1\frac{3}{8}$

c. $8\frac{2}{3} \times 4\frac{1}{2}$

d. $\frac{2}{3} \div \frac{1}{2}$

g. $6\frac{1}{3} \times 3$

h. $\frac{3}{4} + \frac{5}{6} + \frac{7}{12}$

i. $10 \times 6\frac{1}{5}$

j. $9 \div \frac{1}{3}$

k. $7\frac{1}{4} - 2\frac{3}{4}$

l. $4\frac{1}{2} - 1\frac{3}{5}$

n. $9\frac{1}{2} \times 6\frac{1}{2}$

o. $12\frac{1}{2} \times 4$

p. $39 \div 1\frac{1}{2}$

q. $1\frac{1}{3} + 1\frac{1}{3} + 1\frac{5}{6}$

BASIC MATHEMATICS II

UNIT II

DECIMALS

A. The Meaning of Decimal Fractions

(SUGGESTIONS FOR TEACHING ASSIGNMENT 17)

It is the aim of every teacher of mathematics to develop an appreciation of the important role that mathematics has in our daily lives. Decimals afford to the teacher one of the best opportunities to show this important role.

Students should bring to class clippings from newspapers and magazines to show the practical uses of decimals. Place an illustration such as the following on the blackboard:

The population of Russia - 200.2 million people
The output of steel - 112.7 million tons
Hank Aaron is batting .359
Spahn's earned run average is 3.07
A skier jumped 349.9 feet
U.S. to show deficit of 4.8 billion dollars

Have these statements and others brought in by students discussed in class to show how useful decimals are. Sports are an excellent example of the use of decimals. It would be well to have one of the boys in class give some of the averages of the major league stars.

The second step in the meaning of decimals is to develop the relationship among whole numbers, fractions and decimals. A decimal is a fraction whose numerator is written but whose denominator is not written but is understood. In a fraction the numerator shows the number of parts and the denominator shows the size of parts. In a decimal fraction we write only the numerator, and we show the denominator by position. Example:

$$\begin{array}{l} \text{Number of parts} \rightarrow \\ \text{Size of parts} \rightarrow \end{array} \frac{5}{10} = .5$$

5 shows the number of parts and its position in the first place is the size of the parts (tenths).

Both types indicate a part of a whole thing. Common fractions may indicate size of any parts, but decimal fractions may have only parts that are powers of 10. When we show the denominator by the position of the numerator we have a decimal fraction.

Begin the work in decimals with common fractions whose denominators are 10, 100, and 1000. In decimals the first place to the right of the decimal point stands for tenths:

.6 six tenths .9 nine tenths .1 one tenth

The second place to the right of the decimal point is hundredths:

.26	twenty-six hundredths	.98	ninety-eight hundredths
.11	eleven hundredths	.01	one hundredth

The third place to the right of the decimal point is called thousandths:

.128	one hundred twenty-eight thousandths
.989	nine hundred eighty-nine thousandths
.001	one thousandth

To tell the size of a decimal, we look at the place of the the last figure on the right.

A number made up of a whole number and a decimal is called a mixed decimal. The decimal point is always read "and."

2.5	two and five tenths
4.92	four and ninety-two hundredths
63.007	sixty-three and seven thousandths

The decimal point separates the whole from the parts. Any figure at the right of the ones is a part, or fraction, of one. The decimal point shows where the whole number ends and the decimal begins. In reading mixed decimals, the first figure gives the whole number its name, and the last figure gives the decimal its name. Example: 4,254.95

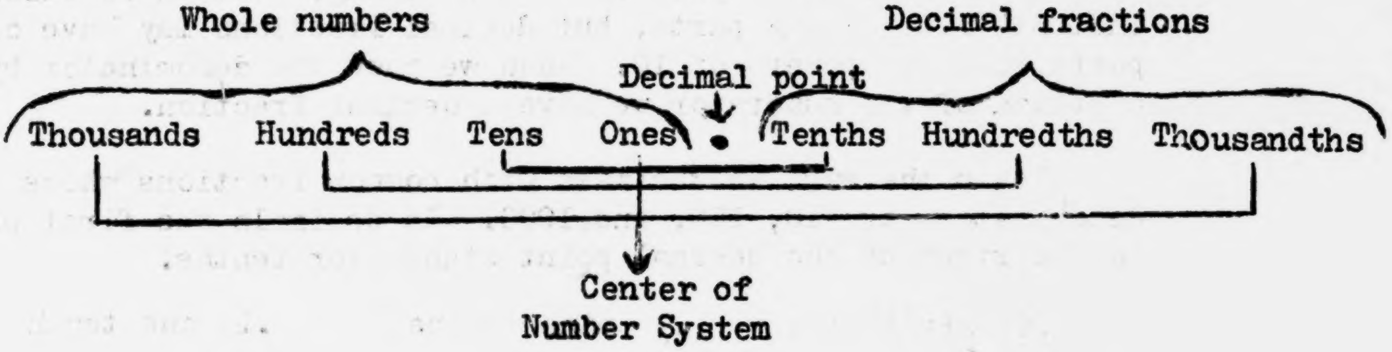
thousands hundredths

All of the meanings, definitions, and examples above should be explained and worked out very carefully before starting Assignment 17.

B. Place Value in Decimals

(SUGGESTIONS FOR TEACHING ASSIGNMENT 18)

The word decimal comes from the Latin word which means ten. Our number system is a decimal system since it is based on ten. The purpose of the decimal point is to identify the ones' place. The ones' place is the point of reference from which other positions on the number scale are identified. Have the students study this figure from the blackboard:



There is a symmetrical arrangement of corresponding places measured from ones' place. From this figure the student is able to see that the tens' place is one place to the left of the ones' place and the tenths' place is one place to the right of the ones' place, and so on for the other places. If the decimal point were the reference point, then this would not be true.

Each figure in a number tells both number and value. Using the drawing above, have the students identify the value of each place in the following numbers:

72.5   83.72   929.54   26.793   7,432.976

To show the relation between decimal parts, cross rule a section of blackboard into 100 squares. Have one student fill in 10 of the squares and another student fill in 1 square. The 100 squares represent the whole thing (1 whole); the 10 squares are 1/10 of the whole thing, and the 1 square is $\frac{1}{100}$ of the whole thing. From this the student will see that the value of each place is 10 times the value of the place to the right. That is: 1 = 10 tenths;   1 tenth = 10 hundredths

To compare decimal fractions they must be expressed in the same units, or another way to say it is they must have the same number of decimal places. From fractions we can do the following:

$$\frac{3}{10} = \frac{3 \times 10}{10 \times 10} = \frac{30}{100} \qquad \frac{3}{10} = \frac{3 \times 100}{10 \times 100} = \frac{300}{1000}$$

$$\frac{3}{10} = \frac{30}{100} = \frac{300}{1000}$$

or .3 = .30 = .300

From this and other examples show that adding zeros after the last figure to the right of the decimal point does not change the value of the decimal.

With the increased production in industry and the expansion of our economic system, large numbers (millions and billions) are becoming more common. Headlines such as the following are not uncommon:

"Federal budget 12.5 billion in red in 1959."
"Government spent 40.1 billion for defense in 1959."

In order to save space and convey more meaning, the newspapers leave off the zeros. Put the problems on the board and explain how to convert the short form to the long form:

2.5 million = 2,500,000   7.6 billion = 7,600,000,000
12.3 million = 12,300,000   63.2 billion = 63,200,000,000

and the long form to the short form:

7,600,000 = 7.6 million   9,500,000,000 = 9.5 billion
12,900,000 = 12.9 million   86,100,000,000 = 86.1 billion

C. Addition of Decimals

(SUGGESTIONS FOR TEACHING ASSIGNMENT 19)

Addition of decimals is no more difficult for most students than addition of whole numbers. In whole numbers:

$$\begin{array}{r} 21 \\ \underline{+43} \end{array} \qquad \begin{array}{l} 2 \text{ tens} + 1 \text{ one} \\ \underline{+4 \text{ tens} + 3 \text{ ones}} \\ 6 \text{ tens} + 4 \text{ ones, or } 60 + 4 = 64 \end{array}$$

In decimals:

Words	Mixed Numbers	Mixed Decimals
1 and 3 tenths	$1\frac{3}{10}$	1.3
+4 and 6 tenths	$+4\frac{6}{10}$	+4.6
5 and 9 tenths	$5\frac{9}{10}$	5.9

Emphasize that decimals are fractions. All rules for decimals come from fractions. Use the following examples to show the position of the decimal point in the answer:

$$\begin{array}{r} \frac{7}{10} \\ \underline{+\frac{6}{10}} \\ \frac{13}{10} = 1\frac{3}{10} \end{array} \qquad \begin{array}{r} .7 \\ \underline{+\ .6} \\ 1.3 \end{array} \qquad \begin{array}{r} 7\frac{8}{100} \\ \underline{+\ 19\frac{9}{100}} \\ 26\frac{17}{100} \end{array} \qquad \begin{array}{r} 7.08 \\ \underline{+\ 19.09} \\ 26.17 \end{array}$$

$$\begin{array}{r} 5\frac{67}{100} \\ \underline{+\ 7\frac{94}{100}} \\ 12\frac{161}{100} = 13\frac{61}{100} \end{array} \qquad \begin{array}{r} 5.67 \\ \underline{+\ 7.94} \\ 13.61 \end{array}$$

Emphasize the following points in adding decimals:

1. Write the numbers in a column with the decimal points under each other.

2. Place the decimal point in the sum before adding. In this way you avoid the error of forgetting to put the decimal point in the answer.

ASSIGNMENT 17

1. Bring to class at least three newspaper or magazine clippings in which you found decimals.

2. Read the following:

   a. 6.5
   b. 83.1
   c. 6.52
   d. 289.25
   e. 3,675.11
   f. 2.896
   g. 5.01
   h. 80.002

3. Write in words:

   a. 2.3
   b. 21.1
   c. 68.52
   d. 723.47
   e. 60.09
   f. 47.023

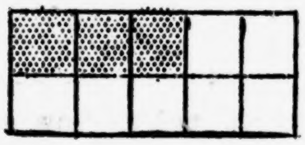
4. Write these numbers as figures:

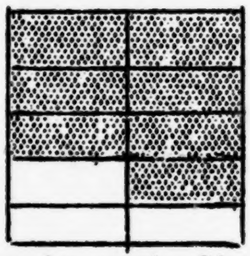
   a. ten and seven hundredths
   b. seven hundred and twelve thousandths
   c. one hundred six and six hundredths
   d. seventeen and seven tenths
   e. sixty-one thousandths

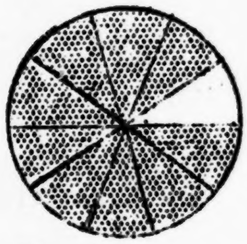
5. Write these decimals as fractions. Reduce to lowest terms:

   a. .2
   b. .35
   c. .7
   d. .20
   e. .08

6. Using these figures answer the questions:

a.


b.


c.


   a. Into how many parts is each figure divided?
   b. Write the fraction that indicates what part of each figure is shaded.
   c. Write the decimal that indicates what part of each figure is unshaded.

7. Read the following:

   a. .4 inches
   b. 8.6 seconds
   c. 12.1 minutes
   d. 6.5 feet
   e. .27 pounds
   f. 23.79 feet
   g. 6.09 years
   h. 120.003 feet

8. Write as decimals:

   a. $\frac{9}{10}$
   b. $\frac{14}{100}$
   c. $\frac{27}{1000}$
   d. $\frac{1}{100}$
   e. $\frac{17}{1000}$
   f. $\frac{2}{100}$
   g. $10\frac{5}{10}$
   h. $12\frac{17}{100}$
   i. $23\frac{19}{1000}$
   j. $17\frac{4}{100}$
   k. $83\frac{9}{1000}$
   l. $264\frac{18}{100}$

9. The following examples illustrate the importance of placing the decimal point correctly. In each problem pick out the best answer. Note that the digits are the same; only the decimal point varies.

   a. The average speed of a jet plane was described as (67.5, 6.75, 675) miles per hour.

   b. Jack's three-week-old brother weighs (10.5, 1.05, 105) pounds.

   c. When the snow began to fall, the temperature outdoors was (285, 28.5, .285) degrees above zero.

   d. A new 1959 car costs ($289.95, $28.95, $2895.95).

   e. The temperature outside is (817, .817, 81.7) degrees.

   f. George weighs (.1043, 1.043, 1043, 104.3) pounds.

   g. Helen is (60.5, .605, 6.05, 605) inches tall.

   h. The boys hiked (.47, 4.7, 47) miles.

   i. Gasoline costs (.269, 2.69, 26.9, 269) cents a gallon.

10. Fill in the blanks so that each column will show two ways of writing the same number.

Fraction	$\frac{3}{10}$	$\frac{7}{10}$		$\frac{41}{100}$	$\frac{99}{100}$			$12\frac{42}{100}$	$9\frac{7}{100}$	
Decimal	.3		.1			.624	5.8			8.003

11. Pick out the word or the group of words that tells how each decimal should be read:

   a. .7 seven tens ; seven tenths ; seven ; seven hundredths

   b. .34 thirty-four ; thirty-four tenths ; thirty-four hundredths

   c. .03 three tenths ; three hundredths ; three ; three thousandths

   d. .50 fifty tenths ; five hundredths ; fifty hundredths ; fifty

   e. 8.3 eighty-three ; eight and three hundredths ; eight and three tenths

   f. 37.5 three hundred seventy-five ; three and seventy-five hundredths ; thirty-seven and five tenths

12. Circle the tenths; underline the hundredths; place a check above the thousandths:

    .07　　.70　　.2　　.019　　.666

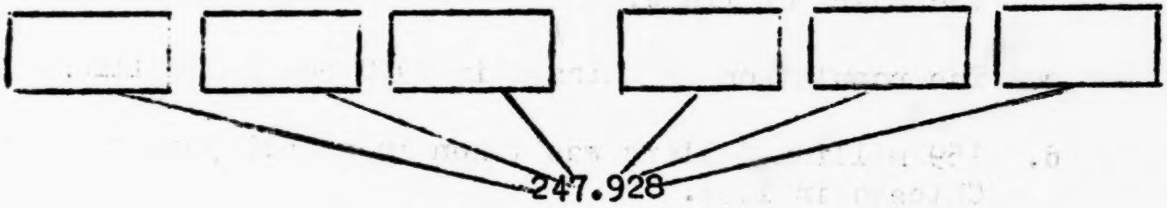
13. The temperature of a person is measured in degrees, broken down to a tenth of a degree. The following is a temperature chart:

8 A.M.	100.3°	4 P.M.	101.5°	Midnight	98.6°
Noon	99.9°	8 P.M.	98.4°		

a. Read each temperature.
b. If 98.6° is normal temperature, at what times was this person's temperature above normal?
c. At what time was this person's temperature below normal?
d. When was it normal?

ASSIGNMENT 18

1. Write the correct name of the place in each box:



2. Fill in the blanks:

a. The first place to the left of the decimal point is the __________ place.

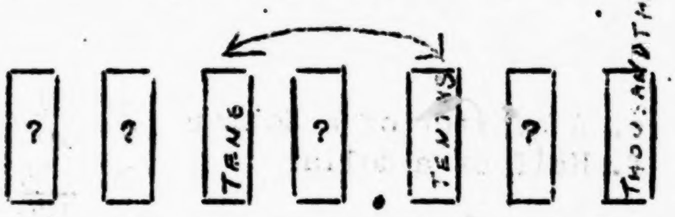
b. The first place to the right of the decimal point is the __________ place.

c. The second place to the left of the decimal point is the __________ place.

d. The second place to the right of the decimal point is the __________ place.

e. The value of each place is__________times as much as the value of the place to its right.

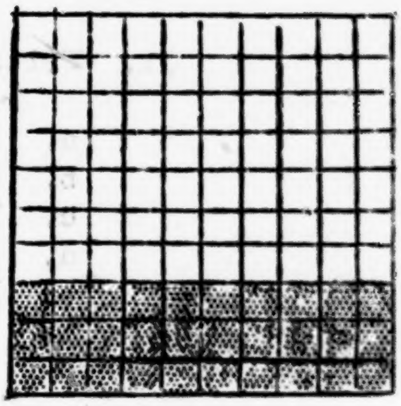
3. In the figure fill in the missing names and arrows.



4. Using the 100 square figure at the right:

a. Write two decimals that tell what part is shaded.

b. Write two decimals that tell what part is unshaded.



5. What is the size of the parts in each decimal?

a. .3 b. .46 c. .01 d. .005

6. The denominators of decimal fractions are known even if they are not written. In each decimal tell what the denominator would be if they were changed to fractions.

a. .5 b. .25 c. .750 d. .03 e. .005

7. In each statement write the number with all the necessary zeros:

a. Total steel production in the Chicago area in a year was 24.7 million tons.

b. 13.0 billion bushels of grain are traded every year on the Board of Trade.

c. The population of Chicago in 1950 was 3.6 million.

d. 159 million dollars was taken in at all post offices in Chicago in 1957.

8. The table shows the home attendance in 1958 for several major league baseball teams. Write each figure in short form (without the zeros).

Team	Attendance
Chicago White Sox	797,000
Chicago Cubs	979,000
Los Angeles Dodgers	1,800,000
Milwaukee	1,900,000
New York Yankees	1,400,000

9. Change the numbers in Column A to the long form and those in Column B to the short form:

A	B
1.6 million	1,500,000
16.2 million	7,600,000,000
7.1 million	2,100,000
103.9 billion	13,900,000,000

10. Write as decimals:

a. 4¢ c. 43¢ e. A quarter of a dollar g. $\frac{9}{10}$ of a dollar
b. 17¢ d. 99¢ f. Half of a dollar h. $\frac{35}{100}$ of a dollar

11. Write as decimal mixed numbers:

a. Three dollars
b. Seven dollars and thirteen cents
c. Thirty-two dollars and six cents
d. Four and three hundredths dollars
e. Nineteen and seventy-one hundredths dollars

12. Draw three 100 square graphs. Shade $\frac{100}{100}$ of the first, $\frac{10}{100}$ of the second, and $\frac{1}{100}$ of the third. From the three graphs:

    a. Which is larger .1 or 1?
    b. Which is larger .1 or .01?
    c. Which is larger .01 or 1?

13. Tell which is the largest number in each group:

    a. .6 .006 6 c. .003 .03 .3
    b. .05 .5 5 d. .5 5 .05

14. Arrange each group in order of size, beginning with the smallest number in each group:

a.	b.	c.	d.
.76	.19	.09	.06
.875	.01	.009	.63
.9	.001	.99	.2
.04	.10	.90	.125

15. Change these fractions to decimals and then tell which is larger:

    a. $\frac{2}{5}$ or $\frac{1}{2}$ b. $\frac{1}{2}$ or $\frac{1}{5}$

16. Which of the following decimals are equal in value?

    a. .3 .03 0.3 .31 .300 0.30
    b. .20 .222 .200 .002 .02 .2 .202

17. Find all the numbers below that are equal to $4\frac{1}{2}$:

    $4\frac{5}{100}$ 4.50 4.05 $\frac{9}{2}$ $4\frac{50}{100}$ $4\frac{5}{10}$

18. Tell which number in each group is the smallest and which is the largest:

a.	b.	c.	d.
.3983	4276	99.89	900.9
398.3	42.76	9989	9.009
39.83	4.276	9.989	9009
3.983	427.6	998.9	90.09

19. If you are counting by tenths, what is the next number after each of the following:

    a. .4 b. 17.3 c. 67.9 d. 49.9

20. Find the missing numbers:

    a. .7, .8, __________, 1.0, 1.1, 1.2, __________

    b. 4.8, 4.9, __________, 5.1, 5.2, __________

    c. 5.2, __________, 5.4, __________, 5.6, __________

    d. __________, 6.1, __________, 6.3, __________

21. The libraries in this country use the Dewey decimal system for classifying books. Books are classified by subject as follows:

Number	Subject	Number	Subject
100-199	Philosophy	500-599	Pure Science
200-299	Religion	600-699	Applied Science
300-399	Social Studies	700-799	Art and Recreation
400-499	Languages	800-899	Literature
		900-999	History

Under what numberswould you find each of these books?

a. How to Play Baseball
b. Religion in the United States
c. Philosophies of Our Times
d. History of the American Indian
e. Advanced Spanish

22. Using the information in Exercise 21, tell what subject each numbered book would be about:

a. 523
b. 679
c. 104
d. 293.4
e. 896.9
f. 743.89
g. 649.283
h. 976.001
i. 634.892

23. In each group below draw a circle around the number with the greatest value:

a. 6.7 6.07 .067
b. .08 .85 .80
c. 120.6 120.65 120.06
d. 2.2 2.20 2.25
e. .098 .9 .98

24. Batting averages in baseball are written as decimals. If a batter's average is .325, it means he got on an average 325 hits in every 1000 times he came to bat. The following are the averages of batting champions in each year:

1958	Richie Ashburn	.349
1957	Ted Williams	.388
1956	Mickey Mantle	.353
1955	Al Kaline	.340

a. Read each average.
b. Tell what each one means.
c. Who had the best average?

25. Copy the following headings and decimals. Fill in missing numbers:

	Tenths	Hundredths	Thousandths
a.	.2	.20	.200
b.	.5		
c.		.70	
d.			.900
e.	2.4		

ASSIGNMENT 19

Add and write the sums:

1.	.2	2.	.3	3.	.6	4.	.9	5.	3.5
	.1		.4		.7		.5		6.8
	.5		.2		.8		.8		2.1

6.	2.4	7.	3.1	8.	.53	9.	.23	10.	1.59
	2.6		9.2		.46		.51		.87
	1.9		8.2		.76		.79		5.98
									.58

11.	3.69	12.	2.87	13.	.916	14.	.959	15.	6.809
	7.45		1.12		.693		.648		.775
	.58		3.97		.689		.220		.932
	1.57				.075		.108		5.894

Copy the numbers in each example in a column and add:

16. .8, .1, .9, .3
17. .38, .06, .09, .64
18. .035, .907, .461
19. 6.278, 1.903, .731, .129
20. 8.57, .42, 8.01, .56
21. .723, 7.358, .839, 5.044
22. .242, 7.197, .978, 7.515
23. .026, .440, .203
24. 7.234, 7.805, 3.408, .066

25. From Charles' house to Jack's house the distance is 1.8 miles. From Jack's house to the store is 1.3 miles, and the school is .5 miles beyond the store. How far does Charles live from the school if Jack's house and the store are between his house and the school?

26. In a recent year the rainfall in Chicago during March was 2.6 inches; during April it was 2.8 inches; and during May, 3.5 inches. What was the total amount of rainfall in Chicago for the three months?

27. Cycling clubs have become very popular in the United States. On a bicycle the instrument that measures the number of miles traveled is called a cyclometer. Jim, Harry, and Al are members of a club that rode 23.1 miles on a Sunday trip. If the numbers below indicate the readings of their cyclometers at the beginning of the trip, find the reading of each one at the end of the trip.

Jim - 742.5 Harry - 623.4 Al - 72.8

28. Surveyors measured a building lot and found that the four sides measured 74.63, 78.24, 148.68, and 151.27 feet, respectively. Find the distance around the lot.

29. In 1956, there were 1.8 million Americans in kindergarten, 26.2 million in grade school, and 8.5 million in high school. Find the total number of people in all three groups in 1956.

30. Take each number in Exercise 29 (including the answer) and write out the number with all the zeros put in.

31. Find the sum or total in each problem. Don't forget the dollar sign and the decimal point.

a.	b.	c.	d.
$2.20	$ 9.38	$86.53	$289.93
3.41	45.47	4.69	174.67
2.07	.73	.94	92.99
1.97	80.40	95.02	700.07

32. Find the total cost of a TV set at $229.95, a television antenna at $12.50, installation $10.00, and a one-year service policy at $43.00.

33. There are two ways to drive from Milwaukee to Chicago. By one route it is 84.9 miles, and by the other it is 87.5 miles. How many miles will you drive if you go by one route and come back by the other?

34. A commercial airplane flew 189.7 miles the first hour, 214.7 miles the second hour, and 198.6 miles the third hour. How far did the plane fly in three hours?

35. The price of gasoline includes state and federal taxes. In the table below the cost per gallon of the gas, state tax, and federal tax are given for several states. Find the total cost:

State	Cost of Gas	State Tax	Federal Tax	Total Cost
Illinois	22.8¢	5¢	3¢	
Indiana	21.3¢	6¢	3¢	
Wisconsin	22.1¢	6¢	3¢	
Michigan	21.9¢	6¢	3¢	

36. At a gasoline station, the price of gasoline was 21.9¢ per gallon plus a tax of 7.8¢ a gallon. Find the cost of a gallon of gasoline.

37. Add: $20.50, $4.75, $10

38. Add: $7.98, $40, $19.95

D. Subtraction of Decimals

(SUGGESTIONS FOR TEACHING ASSIGNMENT 20)

The problems that must be handled most carefully in subtraction of decimals are those involving the process of borrowing.

The problems that involve no borrowing should be worked first.

$$\begin{array}{lcccc}
\textbf{Fractions} & \frac{7}{10} & \frac{47}{100} & 5\frac{16}{100} & 87\frac{41}{1000} \\
 & -\frac{4}{10} & -\frac{24}{100} & -2\frac{5}{100} & -33\frac{30}{1000} \\
\hline
 & \frac{3}{10} & \frac{23}{100} & 3\frac{11}{100} & 54\frac{11}{1000} \\
\textbf{Decimals} & .7 & .47 & 5.16 & 87.041 \\
 & -.4 & -.24 & -2.05 & -33.030 \\
\hline
 & .3 & .23 & 3.11 & 54.011
\end{array}$$

Do a problem in borrowing in whole numbers and a problem in borrowing in fractions before borrowing in decimals.

$$\begin{array}{rcl}
72 = 7 \text{ tens } 2 \text{ ones} & = & 6 \text{ tens } 12 \text{ ones} \\
-39 = 3 \text{ tens } 9 \text{ ones} & = & \underline{3 \text{ tens } \;\; 9 \text{ ones}} \\
 & & 3 \text{ tens } \;\; 3 \text{ ones} \\
 & & \text{or } 30 + 3 = 33
\end{array}
\qquad
\begin{array}{rcl}
8\frac{2}{10} & = & 7\frac{12}{10} \\
-2\frac{5}{10} & = & 2\frac{5}{10} \\
\hline
 & & 5\frac{7}{10}
\end{array}$$

Apply the same ideas to subtraction of decimals.

$$\begin{array}{rcl}
8.2 = 8 \text{ ones and } 2 \text{ tenths} & = & 7 \text{ ones and } 12 \text{ tenths} \\
-2.5 = 2 \text{ ones and } 5 \text{ tenths} & = & 2 \text{ ones and } \;\; 5 \text{ tenths} \\
\hline
 & & 5 \text{ ones and } \;\; 7 \text{ tenths, or } 5.7
\end{array}$$

When you borrow the whole number 1, you change it to 10 tenths. Do the following problems on the blackboard:

$$\begin{array}{ccccc}
7.2 & 49.2 & 8.92 & 89.15 & 67.146 \\
\underline{-5.7} & \underline{-31.5} & \underline{-4.68} & \underline{-23.68} & \underline{-29.978}
\end{array}$$

One of the troublesome problems is the case where there is one more place in the subtrahend than in the minuend. Although there are few practical applications of these problems, they do occur in standardized tests and civil service examinations.

$$\begin{array}{lrcl}
\textbf{Fractions} & 7 & = & 6\frac{10}{10} \\
 & -2\frac{3}{10} & = & 2\frac{3}{10} \\
\hline
 & & & 4\frac{7}{10}
\end{array}
\qquad
\begin{array}{rcccl}
62\frac{3}{10} & = & 62\frac{30}{100} & = & 61\frac{130}{100} \\
-41\frac{47}{100} & = & 41\frac{47}{100} & = & 41\frac{47}{100} \\
\hline
 & & & & 20\frac{83}{100}
\end{array}$$

$$\begin{array}{lrcl}
\textbf{Decimals} & 7 & = & 7.0 \\
 & -2.3 & = & 2.3 \\
\hline
 & & & 4.7
\end{array}
\qquad
\begin{array}{rcl}
62.3 & = & 62.30 \\
-41.47 & = & 41.47 \\
\hline
 & & 20.83
\end{array}$$

Avoid as you did in fractions, the expression "bring down a number." Do the following examples on the blackboard before starting Assignment 20:

$$\begin{array}{r} 8 \\ \underline{-\ 2.3} \end{array} \qquad\qquad \begin{array}{r} 4.9 \\ \underline{-\ 2.27} \end{array} \qquad\qquad \begin{array}{r} 27.3 \\ \underline{-\ 19.46} \end{array} \qquad\qquad \begin{array}{r} 378.9 \\ \underline{-\ 284.49} \end{array}$$

E. Multiplication of Decimals

(SUGGESTIONS FOR TEACHING ASSIGNMENT 21)

Decimals are fractions. When you multiply decimals you are really multiplying fractions. For the students in Basic Mathematics, probably the best way of developing the rule for multiplication of decimals is to start with fractions and then convert the fractions to decimals. Place the following problems in multiplication of fractions on the blackboard and have the students work them out:

$$\frac{3}{10} \times 3 = \frac{9}{10} \qquad\qquad 7 \times \frac{1}{10} = \frac{7}{10}$$

$$\frac{7}{10} \times 9 = \frac{63}{10} = 6\frac{3}{10} \qquad\qquad 7 \times \frac{3}{10} = \frac{21}{10} = 2\frac{1}{10}$$

Convert the problems and the answers to decimals

$$.3 \times 3 = .9 \qquad\qquad 7 \times .1 = .7$$

$$.7 \times 9 = 6.3 \qquad\qquad 7 \times .3 = 2.1$$

From these problems, the student should see if there is one decimal place in the problem, there is one decimal place in the answer. Continue on in the same manner to develop two decimal places in the product.

$$\frac{11}{100} \times 3 = \frac{33}{100} \qquad 3 \times \frac{13}{100} = \frac{39}{100} \qquad \frac{7}{10} \times \frac{9}{10} = \frac{63}{100}$$

$$.11 \times 3 = .33 \qquad 3 \times .13 = .39 \qquad .7 \times .9 = .63$$

Extend this now to three places:

$$\frac{3}{10} \times \frac{41}{100} = \frac{123}{1000} \qquad \frac{53}{100} \times \frac{7}{10} = \frac{371}{1000} \qquad 3 \times \frac{123}{1000} = \frac{369}{1000}$$

$$.3 \times .41 = .123 \qquad .53 \times .7 = .371 \qquad 3 \times .123 = .369$$

From these problems you can state the rule for placing the decimal point in the product:

> Point off as many decimal places in the product as there are decimal places in the problem.

Work out the following problems on the blackboard with the students:

$$\begin{array}{rrrrr} .7 & 8 & 4.6 & 9.8 & .2 \\ \underline{\times\ 4} & \underline{\times\ .3} & \underline{\times\ \ 5} & \underline{\times\ 72} & \underline{\times\ .8} \end{array}$$

$$\begin{array}{rrrrr} 2.4 & .35 & 6.24 & .67 & .793 \\ \underline{\times\ 3.2} & \underline{\times\ \ 9} & \underline{\times\ \ 3} & \underline{\times\ .9} & \underline{\times\ \ 8} \end{array}$$

One of the items that must be explained carefully is a situation when there are more decimal places to be pointed off than there are figures in the product. Consider these examples:

$$\begin{array}{rrr} .3 & .12 & .05 \\ \underline{\times\ .2} & \underline{\times\ .8} & \underline{\times\ .6} \\ .06 & .096 & .030 \end{array}$$

We write zeros to the left of the product to make the required number of decimal places. Emphasize that the rules for multiplication of decimals comes from the rules for multiplication of fractions.

F. Division of Decimals

(SUGGESTIONS FOR TEACHING ASSIGNMENT 22)

Division is the most difficult process to be performed with decimals, just as division is the most difficult operation with whole numbers. To go into great detail on the reasons for doing each step in division of decimals with Basic Mathematics students is probably too difficult for the students.

Divide the work in division of decimals into two groups: dividing by a whole number, and dividing by a decimal. Use the following illustrations to show dividing a decimal by a whole number:

$$\frac{6}{10} \div 2 = \frac{\overset{3}{\cancel{6}}}{10} \times \frac{1}{\underset{1}{\cancel{2}}} = \frac{3}{10} \qquad \text{or} \qquad \begin{array}{r} .3 \\ 2\overline{)\ .6} \end{array}$$

$$\frac{8}{10} \div 8 = \frac{\overset{1}{\cancel{8}}}{10} \times \frac{1}{\underset{1}{\cancel{8}}} = \frac{1}{10} \qquad \text{or} \qquad \begin{array}{r} .1 \\ 8\overline{)\ .8} \end{array}$$

$$\frac{33}{100} \div 3 = \frac{\overset{11}{\cancel{33}}}{100} \times \frac{1}{\underset{1}{\cancel{3}}} = \frac{11}{100} \qquad \text{or} \qquad \begin{array}{r} .11 \\ 3\overline{)\ .33} \end{array}$$

$$\frac{284}{1000} \div 2 = \frac{\overset{142}{\cancel{284}}}{1000} \times \frac{1}{\underset{1}{\cancel{2}}} = \frac{142}{1000} \qquad \text{or} \qquad \begin{array}{r} .142 \\ 2\overline{)\ .284} \end{array}$$

Generalize these problems into the rule: To divide a decimal by a whole number, write a decimal point in the quotient directly above the decimal point in the dividend and proceed with the division. Do the following examples on the blackboard:

$4\overline{)\,.8}$ $\qquad 3\overline{)\,15.6}$ $\qquad 8\overline{)\,7.2}$ $\qquad 3\overline{)\,.69}$

$2\overline{)\,4.54}$ $\qquad 7\overline{)\,37.457}$ $\qquad 6\overline{)\,58.572}$

At this point, the students can work problems 1-25 in Assignment 22.

The next step is to make the divisor a decimal. Again revert back to fractions to show the placement of the decimal point in the quotient.

$$\frac{8}{10} \div \frac{4}{10} = \frac{\overset{2}{\cancel{8}}}{\underset{1}{\cancel{10}}} \times \frac{\overset{1}{\cancel{10}}}{\underset{1}{\cancel{4}}} = \frac{2}{1} = 2 \qquad \text{or} \qquad \begin{array}{r} 2 \\ .4\overline{)\,.8} \end{array}$$

$$\frac{24}{100} \div \frac{8}{10} = \frac{\overset{3}{\cancel{24}}}{\underset{10}{\cancel{100}}} \times \frac{\overset{1}{\cancel{10}}}{\underset{1}{\cancel{8}}} = \frac{3}{10} \qquad \text{or} \qquad \begin{array}{r} .3 \\ .8\overline{)\,.24} \end{array}$$

$$\frac{48}{100} \div \frac{12}{100} = \frac{\overset{4}{\cancel{48}}}{\underset{1}{\cancel{100}}} \times \frac{\overset{1}{\cancel{100}}}{\underset{1}{\cancel{12}}} = \frac{4}{1} = 4 \qquad \text{or} \qquad \begin{array}{r} 4 \\ .12\overline{)\,.48} \end{array}$$

$$\frac{225}{1000} \div \frac{5}{10} = \frac{\overset{45}{\cancel{225}}}{\underset{100}{\cancel{1000}}} \times \frac{\overset{1}{\cancel{10}}}{\underset{1}{\cancel{5}}} = \frac{45}{100} \qquad \text{or} \qquad \begin{array}{r} .45 \\ .5\overline{)\,.225} \end{array}$$

These examples will lead to the rule for division of decimals. Make the divisor a whole number by moving the decimal point to the right. Move the decimal point in the dividend the same number of places. Indicate these new positions by carets. Place the decimal point in the quotient above the caret in the dividend. Work the following problems on the blackboard:

$\begin{array}{r} . \\ .4\overline{)\,1.6_{\wedge}} \end{array}$ $\qquad \begin{array}{r} . \\ 2.3\overline{)\,1.6_{\wedge}1} \end{array}$ $\qquad \begin{array}{r} . \\ 1.2\overline{)\,14.4_{\wedge}} \end{array}$ $\qquad \begin{array}{r} . \\ .5\overline{)\,.2_{\wedge}25} \end{array}$

After the students have worked these problems carefully, they can work Problems 26-50 in Assignment 22.

There are pitfalls in division of decimals, just as there are in division of whole numbers. We will consider these three cases:

1. Dollars and cents
2. Zeros in the quotient
3. Annexing zeros

If there is a dollar sign and decimal point in the dividend, there must be a dollar sign and decimal point in the quotient, provided that there is no dollar sign in the divisor.

$\begin{array}{r} \$\ . \\ 4\overline{)\,\$\ .56} \end{array}$ $\qquad \begin{array}{r} \$\ . \\ 5\overline{)\,\$6.45} \end{array}$ $\qquad \begin{array}{r} \$\ . \\ 24\overline{)\,\$2.88} \end{array}$

Zeros in quotients constitute one of the most troublesome items in division. Work out several examples as shown below to explain how the zeros appear in the quotients:

```
     .03            021             2.08
  6/ .18       34/  714     7.9/ 16.432
     18             68           15 8
                    34             632
                    34             632
```

Annexing zeros to a decimal is based on the principles that a decimal is a fraction and that the numerator and denominator of a fraction may be multiplied by the same number without changing the value. Use the following examples:

$$\frac{3}{10} = \frac{3 \times 10}{10 \times 10} = \frac{30}{100} \qquad \frac{3}{10} = \frac{3 \times 100}{10 \times 100} = \frac{300}{1000}$$

$$\frac{3}{10} = \frac{30}{100} = \frac{300}{1000}$$

or .3 = .30 = .300

$$\frac{9}{10} = \frac{9 \times 10}{10 \times 10} = \frac{90}{100} \qquad \frac{9}{10} = \frac{9 \times 100}{10 \times 100} = \frac{900}{1000}$$

$$\frac{9}{10} = \frac{90}{100} = \frac{900}{1000}$$

or .9 = .90 = .900

Zeros written after the last figure to the right of the decimal point change the terms but not the value of the decimal. Work the following problems to show annexing of zeros:

```
Problems:  5/ 3     85/ 29.07        4.5/ 171      .54/ 5.297

               .6         .342            38.            9.809
Work:      5/ 3.0   85/ 29.070       4.5/ 171.0    .54/ 5.29700
              3 0       25 5              135           4 86
                         3 57              36 0           437
                         3 40              36 0           432
                           170                             500
                           170                             486
                                                            14
```

The rest of Assignment 22 can now be worked.

G. Review of Decimals

(SUGGESTIONS FOR TEACHING ASSIGNMENT 23)

The problems in Assignment 23 serve as a review of all of the work in decimals. Caution the students to watch the signs carefully so they do the correct operation in each problem.

H. Review

(SUGGESTIONS FOR TEACHING ASSIGNMENT 24)

The problems in Assignment 24 are intended to review all the fundamental operations studied up to this point.

ASSIGNMENT 20

Subtract and write the differences:

1. .9 - .6	2. .4 - .2	3. .8 - .3	4. 8.3 - 2.1	5. 7.4 - 6.5
6. 9.8 - 7.1	7. 7.5 - 5.1	8. 8.3 - 1.9	9. 9.4 - 8.7	10. 4.3 - 3.7
11. .81 - .20	12. 8.92 - 6.30	13. 29.66 - 19.28	14. 63.82 - 51.65	15. .458 - .256
16. .926 - .524	17. .923 - .919	18. .072 - .068	19. 7.587 - 4.431	20. 25.231 - 19.119
21. 257.2 - 199.9	22. 687.23 - 449.76	23. 9.3 - 6	24. 7.48 - 7.4	25. 3.125 - 1.41
26. 12 - 9.2	27. 8 - 2.6	28. 23 - 9.7	29. 46.2 - 8.37	30. 97.3 - 89.49

31. Subtract 1.46 from 9.3
32. Subtract 5.2 from 12
33. Subtract 6.8 from 9.29
34. Subtract 2.1 from 8
35. Subtract 6.94 from 8.6
36. Subtract 23.82 from 69.1

37. The cyclometer on Jim's bicycle showed 124.7 when he left home for his cousin's house. When he got there it showed 127.3. How far did he ride?

38. The table shows the amount of rainfall in the cities during the month of July:

City	Amount of Rainfall	City	Amount of Rainfall
Chicago	2.7 inches	Boise, Idaho	.2 inches
New York	4.2 inches	Los Angeles	.05 inches
New Orleans	7.1 inches	Louisville	3.1 inches

a. Which city had the most rain?
b. Which city had the least rain?
c. How much more rain fell in New York than in Chicago?
d. How much more rain fell in New Orleans than in Louisville?
e. How much more rain fell in Boise than in Los Angeles?
f. From this table what part of the United States is the wettest? The driest?

39. In a recent year a freight car could carry 53.8 tons. Five years earlier the average capacity was 52.6 tons. By how many tons has the capacity increased?

40. Twenty years ago the average person used 17.0 pounds of butter a year. In 1956 the average person used 8.7 pounds of butter. How much more butter was used by each person in one year twenty years ago?

41. The distance an object at sea can be seen depends on how high the person is above the water. The table shows how far an object can be seen when the person looking is at a certain height.

Height of Observer	25 feet	50 feet	100 feet	200 feet
Distance Visible	6.61 miles	9.35 miles	13.23 miles	18.71 mi.

a. How much farther can you see at 50 feet than at 25 feet?
b. How much farther can you see at 200 feet than at 50 feet?
c. How much farther can you see at 100 feet than at 25 feet?
d. If you double the height, do you double the distance you can see?

42. How far you can see an object also depends on the size of the object. The table shows how far an object is visible in relation to the height of the object.

Height of Object	5 feet	10 feet	15 feet	20 feet
Distance Visible	2.9 miles	4.2 miles	5.1 miles	5.9 mi.

a. What is the distance an object five feet high can be seen?
b. What is the distance an object twenty feet high can be seen?
c. How much farther can an object fifteen feet high be seen than an object five feet high?
d. How much farther can an object twenty feet high be seen than an object ten feet high?
e. If you double the height of some object, can it be seen twice as far?

43. During the past twenty years, the amount of frozen foods eaten yearly per person has increased from .4 pounds to 7.3 pounds. How much more frozen foods are eaten per person today than twenty years ago?

44. From New York to San Francisco by way of the Panama Canal is 5262 miles. Around South America the distance is 13,140 miles. How much shorter is the distance by way of the canal?

45. When regular gasoline costs 29.9¢ per gallon and high-test gasoline costs 32.9¢ per gallon, what is the difference in price?

46. Find the missing parts of the magic square.

	1.8	.4
.6	1.0	
1.6		1.2

47. In an airplane race the winner flew 506.523 miles per hour and the second place winner flew 502.993 miles per hour. Find the difference in their speeds.

48. Chicago has three weather stations. They are located at Midway Airport, O'Hare Field, and Grant Park in the loop. In a particular month there was 7.5 inches of rain at the airports, but 2.25 inches at Grant Park. How much less rain was there at Grant Park than at the airports?

ASSIGNMENT 21

1. Write the following fractions as decimals:

a. $\frac{9}{10}$ b. $\frac{1}{10}$ c. $\frac{25}{100}$ d. $\frac{7}{100}$ e. $\frac{325}{1000}$ f. $\frac{12}{1000}$

2. Work each problem in the multiplication of fractions. Change each problem and answer to decimals. Part (a) has been done for you.

a. $\frac{3}{10} \times \frac{7}{10} = \frac{21}{100}$ b. $\frac{9}{10} \times \frac{3}{10}$ c. $\frac{3}{100} \times \frac{7}{10}$ d. $\frac{9}{10} \times \frac{11}{100}$

$.3 \times .7 = .21$

3. .9 x 6 4. .8 x 7 5. 4.63 x 7 6. .29 x 8 7. 3.4 x 9

8. 8.967 x 3 9. .762 x 4 10. .53 x 37 11. .98 x 49 12. $ .45 x 98

13. 6.03 x 39 14. 8.075 x 20 15. .905 x 394 16. 7.50 x 408 17. 8.45 x 318

18. 720 x 50.7 19. 305 x .165 20. 946 x .7 21. 32.86 x .9 22. 9.6 x .24

23. 60.9 x 1.03 24. .71 x 3.6 25. .02 x 3 26. .007 x 4 27. .063 x .25

28. .3 x .3 29. .054 x .85 30. 1.38 x .047

31. A cabinet maker glued together four boards, each .5 inch thick. How many inches thick was the board formed by gluing the four boards together?

32. The distance from Harry's house to school and back is 4.7 miles. How far did he travel in a week in going to and from school?

33. Mr. Turner bought four lots of land. Each lot was 52.6 feet wide. How wide were all four lots together?

34. A machinist fastened eight strips of metal together. Each strip was .06 inch thick. What is the thickness of the eight strips together?

35. About .8 of the weight of a potato is water. How many pounds of water are there in ten pounds of potatoes? In a bushel (60 pounds) of potatoes?

36. The correct numbers are given for these multiplication problems. Tell where the decimal point should be placed in each problem.

a.	b.	c.	d.	e.
.04	80.1	.06	6.3	.04
x .17	x .09	x .7	x .05	x .02
68	7209	42	315	8

37. If a carpenter earns $2.10 per hour, how much does he earn in a 40-hour work week?

38. Experts have calculated that the leaning tower of Pisa in Italy has 200 years to go before it may topple over. Each year it leans an additional .04 inch. How far will it have tilted in 200 years?

39. Car rental has become a big business in the United States. Some car rental services have an arrangement with the air lines so that when passengers reach their destination by plane they have a car reserved. A car rental service in Florida makes the following charges: $34.95 per week, allowing 50 free miles. For miles over 50 you are charged 8¢ a mile. Suppose you rented a car for a week and drove 200 miles. Here is how you would find the cost:

200	150 miles	$34.95
- 50 (free miles)	x $ .08 a mile	+ 12.00
150	$12.00	$46.95

Find the cost of renting a car for each of the following number of miles:

a. 100 miles b. 250 miles c. 500 miles

40. Find the cost of renting a car for five days at $12.50 a day.

41. Recently in a mid-western city the bus drivers rejected a 7.5¢ hourly increase and went on a strike.

a. Suppose each driver works six hours a day. How much would the 7.5¢ hourly increase amount to per day?

b. Each driver works five days a week. How much will the increase amount to per week?

c. If a man works fifty weeks a year, how much will the increase amount to per year?

42. The distance around a certain race track is 1.25 miles. How many miles will a racing car travel in going around the track fifty times?

43. Mr. Ziemba bought twelve gallons of gasoline at 32.5¢ per gallon. How much did he pay for the gasoline?

44. The Pennsylvania Turnpike opened in 1940 as the first modern superhighway. It connects Philadelphia with Pittsburgh. It has been extended now to 453 miles of roadway.

   a. If you traveled 58.7 miles per hour for six hours, how far would you travel?

   b. If you get 13.6 miles per gallon of gasoline with your car, would twenty gallons be enough to travel the length of the Pennsylvania Turnpike?

45. In a certain town the cost of education is $263.77 per pupil. Find the cost of educating the third grade when there are 32 pupils.

46. About .66 of the human body is water. If a person weighs 100 pounds, how much of the weight is water?

47. Using the information in Exercise 46, find the weight of water in each person:

   a. Jack - 62 pounds
   b. Henry - 115 pounds
   c. Mary - 104 pounds
   d. Yourself -

48. Circle the mistake in each example below:

$$\begin{array}{r} 2.375 \\ \underline{x.35} \\ 11875 \\ \underline{7125} \\ 83.125 \end{array} \qquad \begin{array}{r} 4.016 \\ \underline{x\ .85} \\ 20080 \\ \underline{32128} \\ .341360 \end{array} \qquad \begin{array}{r} .225 \\ \underline{x\ .05} \\ .1125 \end{array}$$

49. A watermelon weighs thirty pounds. About .93 of its weight is water. What is the weight of the water?

50. If a train travels 60.1 miles per hour for 3.5 hours, how far will it travel?

ASSIGNMENT 22

Divide:

1. $3\overline{/\ .9}$　2. $2\overline{/\ .6}$　3. $2\overline{/\ 1.2}$　4. $5\overline{/\ 1.5}$

5. $8\overline{/\ 2.4}$　6. $6\overline{/\ 4.8}$　7. $9\overline{/\ 5.4}$　8. $6\overline{/\ 26.4}$

9. $9\overline{/\ 83.7}$　10. $4\overline{/\ .48}$　11. $3\overline{/\ .69}$　12. $2\overline{/\ 4.54}$

13. $5\overline{/\ 3.65}$　14. $7\overline{/\ 15.68}$　15. $6\overline{/\ 3.84}$　16. $4\overline{/\ 1.56}$

17. $8\overline{/\ 22.4}$　18. $6\overline{/\ 21.6}$　19. $12\overline{/\ 85.2}$　20. $23\overline{/\ 186.3}$

21. $71/\overline{248.5}$ 22. $7/\overline{37.457}$ 23. $12/\overline{25.608}$ 24. $15/\overline{9.765}$

25. $8/\overline{72.976}$ 26. $.5/\overline{1.5}$ 27. $2.3/\overline{6.9}$ 28. $3.4/\overline{10.2}$

29. $.15/\overline{2.25}$ 30. $.23/\overline{12.88}$ 31. $.34/\overline{8.16}$ 32. $.51/\overline{1.734}$

33. $.3/\overline{1.59}$ 34. $.37/\overline{.4662}$ 35. $3.2/\overline{14.72}$ 36. $12.2/\overline{5.734}$

37. $8.21/\overline{73.89}$ 38. $1.9/\overline{6.46}$ 39. $3.4/\overline{8.16}$ 40. $3.84/\overline{18.048}$

41. $.758/\overline{.20466}$ 42. $.46/\overline{1.702}$ 43. $.9/\overline{5.4}$ 44. $.6/\overline{4.524}$

45. $6.3/\overline{8.82}$ 46. $.74/\overline{.518}$ 47. $.7/\overline{6.3}$ 48. $.4/\overline{3.04}$

49. $6.9/\overline{5.589}$ 50. $3.5/\overline{7.35}$

If some of these problems do not come out even, add zeros at the end of the decimal:

51. [illegible]$/\overline{\$\ .21}$ 52. $4/\overline{\$\ .36}$ 53. $9/\overline{\$27.36}$ 54. $43/\overline{\$2.15}$

55. $35/\overline{\$26.60}$ 56. $7/\overline{.049}$ 57. $6/\overline{.294}$ 58. $23/\overline{.966}$

59. $36/\overline{.7344}$ 60. $8/\overline{32.08}$ 61. $34/\overline{2.788}$ 62. $32/\overline{2905.6}$

63. $53/\overline{50.35}$ 64. $42/\overline{31.5}$ 65. $7.6/\overline{266}$ 66. $3.5/\overline{1323}$

67. $9.8/\overline{6909}$ 68. $9.4/\overline{611}$ 69. $.07/\overline{4.935}$ 70. $.76/\overline{.07904}$

71. $4/\overline{.072}$ 72. $16/\overline{1.2}$ 73. $.2/\overline{8}$ 74. $.04/\overline{32}$

75. $.12/\overline{84}$

76. Mr. Watson has a lot that is 120.8 feet wide. He wants to divide it into two lots of the same size. How wide should each lot be?

77. Mr. Sloan drove his car 92.5 miles on five gallons of gasoline. How many miles did he get per gallon?

78. The rainiest month in Chicago is the month of June. During one week of June in a recent year, the rainfall amounted to 1.4 inches. What was the average rainfall per day?

79. If 1.44 inches of rain fell in 48 hours, how much rain fell in one hour?

80. A crate of oranges cost $4.92 . There were twelve dozen oranges in the crate. How much was the cost per dozen?

81. Twenty-five boys were playing baseball when a window was broken. If the cost of replacing the broken window was $8.00, what was each boy's share?

82. The Leaning Tower of Pisa in Italy has increased its lean 1.5 inches in 35 years. How much is that per year?

83. The table shows the number of take-offs and landings by airlines per day in each of the cities. Find the number per hour for each city.

City	Number of Take-offs and Landings
New York	1216
Chicago	882
Los Angeles	620
Washington	514

84. A gallon of water weighs about 8.3 pounds. How many gallons are there in 913 pounds?

85. People who ride suburban transportation each day, such as the Illinois Central and the Northwestern railroads, buy a ticket that is good for a month, rather than pay the fare each day. It is more convenient and economical. If you work 22 days in a month and you pay $21.12 for a monthly ticket, how much does it cost per day to ride the train?

86. Harry buys a 12-ride ticket for $2.40. How much does each ride cost?

87. Total amount of precipitation (rain and snow together) in Chicago each year is 32.72 inches. What is the average monthly precipitation?

88. How fast an object is traveling is sometimes very difficult to visualize. In each problem below find the distance in feet traveled in one second:

   a. World's record for bicycle racing for one mile (5,280 feet) is 111 seconds.

   b. Ice skating speed record is 161 seconds for a mile.

   c. Track record for men is 237 seconds for one mile.

89. In 1948 a famous runner ran 100 yards in 9.3 seconds. How many yards did he run in one second?

90. From Chicago to New York by train is 951.5 miles. If a train leaves Chicago at 4 P.M. and arrives in New York at 8 A.M. (Chicago Time) the next morning, find the number of hours and the rate per hour.

91. At the supermarket Mrs. O'Neil bought three pounds of hamburger for $2.07. What was the price per pound?

92. From 16.8 pounds of carrots the grocer made fourteen bunches of carrots. What is the average number of pounds of carrots in each bunch?

ASSIGNMENT 23

The problems in this assignment review all the work in decimals. Do the proper operation and work carefully.

1. $\begin{array}{r} .48 \\ 3.69 \\ 8.43 \\ +\ 7.56 \\ \hline \end{array}$	2. $\begin{array}{r} 10.53 \\ -\ 4.87 \\ \hline \end{array}$	3. $\begin{array}{r} \$69.75 \\ \times\ \ \ 84 \\ \hline \end{array}$	4. $\begin{array}{r} 27.4 \\ 175.4 \\ 83.0 \\ +\ \ 1.9 \\ \hline \end{array}$
5. $\begin{array}{r} 21.76 \\ -\ 9.98 \\ \hline \end{array}$	6. $\begin{array}{r} 17.30 \\ -\ \ .07 \\ \hline \end{array}$	7. $\begin{array}{r} 194.5 \\ \times\ 1.4 \\ \hline \end{array}$	8. $\begin{array}{r} 800.7 \\ \times\ \ .48 \\ \hline \end{array}$
9. $9\overline{)\,1.98}$	10. $1.2\overline{)\,36.24}$	11. $\begin{array}{r} .05 \\ \times\ .4 \\ \hline \end{array}$	12. $\begin{array}{r} 8.15 \\ 2.47 \\ 5.00 \\ +\ 6.04 \\ \hline \end{array}$
13. $\begin{array}{r} 90.01 \\ \times\ \ .6 \\ \hline \end{array}$	14. $\begin{array}{r} 800.7 \\ \times\ \ .48 \\ \hline \end{array}$	15. $\begin{array}{r} 8.976 \\ -\ 2.999 \\ \hline \end{array}$	

16. The following amounts of snow fell during a five-day period: 2.1 inches, 1.7 inches, 2.5 inches, .7 inches, and 1.1 inches. Find the total.

17. Write 427 cents using a dollar sign and decimal point.

18. The school bought new textbooks for the Basic Mathematics class. There are 32 students in the class and the books cost $63.36. Find the cost of one book.

19. By delivering papers Charles earned $3.25 a week for fourteen weeks. How much did he earn in all?

20. Write the following as decimals:

a. $3\frac{35}{100}$ b. Three hundredths

c. Five and five tenths d. $\frac{1}{100}$

21. Write the following as fractions:

a. .6 b. .55 c. .01 d. 3.58 e. .006

22. $9.08
x 36

23. $675.43
52.61
837.08
+ 9.65

24. $880.26
- 395.78

25. 6.7/12.06

26. Mr. Smith earns $375.00 a month. How much does he earn in a year?

27. Mr. Lincoln rented a boat for three hours at 75¢ for the first hour and 50¢ for each additional hour. How much rent should he pay?

28. At the store Mrs. Carlson bought a quart of milk for 21¢, a pound of bacon for 76¢, and a can of peas for 18¢. How much change should she receive from $2.00?

29. If your telephone bill for the year was $80.64, what was your average monthly bill?

30. Fill in the missing parts of the table:

Fraction	$\frac{7}{10}$		$\frac{56}{100}$		$5\frac{7}{100}$	
Decimal		.03		.324		6.003

31. 1.896
.924
+ 3.756

32. 27.462
- 18.390

33. 7.009
14.906
6.007
+ 5.030

34. 7.000
- 5.629

35. At 3 P.M. the barometer reading was 30.24 inches; at 4 P.M., it was 29.86 inches. How much had the barometer fallen?

36. 3/ 7.29

37. 18.74
x .096

38. 15/ 30.75

39. .77
x 9

40. 2.5/ 2.25

41. 200
x .78

42. .05/ 4.0

43. 47.8
x 1.06

44. If a train travels sixty miles per hour for 3.5 hours, how far does it travel?

45. Find the missing numbers in the magic square:

2.6	1.9	
2.1	2.3	2.5
	2.7	2.0

46. The table at the right indicates the distances from Chicago to each of the cities.

a. How far is it from Chicago to Racine?

b. How far is it from Chicago to Milwaukee?

c. How far is it from Evanston to Kenosha?

d. Harry rode from Winnetka to Highland Park. How far did he ride?

e. Jim rode from Highland Park to Waukegan. How far did he ride?

f. Who rode farther, Harry or Jim?

From Chicago To	Miles
Chicago	0.0
Evanston	12.1
Winnetka	16.7
Highland Park	23.2
Waukegan	35.9
Kenosha	51.6
Racine	61.9
Milwaukee	85.0

47. Tell which is larger in each pair of decimals:

a. .4 or .04 c. .6 or .006 e. 5.3 or .053

b. .740 or .704 d. .798 or .079 f. .002 or .02

48. Arrange in order of size, beginning with the smallest:

a. .12, 1.2, .012 b. 1.4, 1.04, 10.4 c. .025, .02, .0205

49. Which is the smallest number?

.03 .3 3 .003 3.3 33

50. A furlong is 1/8 mile. How many feet are there in a furlong?

ASSIGNMENT 24

1. $\begin{array}{r} 6\frac{3}{4} \\ 5\frac{1}{2} \\ +\ 4\frac{7}{8} \\ \hline \end{array}$ 2. $\begin{array}{r} 857 \\ \times\ 38 \\ \hline \end{array}$ 3. $\begin{array}{r} 8 \\ -\ 4\frac{5}{9} \\ \hline \end{array}$ 4. $\begin{array}{r} 10\frac{1}{3} \\ +\ 7\frac{2}{3} \\ \hline \end{array}$ 5. $\begin{array}{r} 9\frac{7}{12} \\ +\ 5\frac{3}{4} \\ \hline \end{array}$

6. Circle each fraction below that is $\frac{1}{2}$ or more:

$\frac{5}{6}$ $\frac{3}{8}$ $\frac{3}{6}$ $\frac{3}{5}$ $\frac{5}{8}$ $\frac{1}{3}$

7. Supply the missing numerators:

$\frac{6}{8} = \frac{\ }{4}$ $\frac{8}{12} = \frac{\ }{3}$ $\frac{5}{10} = \frac{\ }{2}$ $\frac{3}{9} = \frac{\ }{3}$

8. The high school basketball team made 1242 points in 23 games. How many points did they average per game?

9. Circle yes or no:

   a. A proper fraction is always less than one. Yes No
   b. An improper fraction is always more than one. Yes No
   c. In addition of fractions the sums can always be reduced. Yes No
   d. If you forget to cancel, your answer will be incorrect. Yes No

10. Anne bought a hat for $2.75, shoes for $6.98, and a sweater for $5.79. She gave the saleslady a twenty-dollar bill. How much change should Anne receive?

11. Write the largest number possible using 3, 5, 9, 4, and 0.

12. The tallest man in the world is 9 feet, $3\frac{1}{2}$ inches tall.

   a. How much taller is he than you?
   b. How tall is your best friend?
   c. Add your friend's height and yours together. Does it equal the tallest man's height?

13. Write the multiplication that means the same as:

$$5 + 5 + 5 + 5 + 5 + 5 + 5$$

14. If a clerk sorts 42 pieces of mail a minute, how many pieces does he sort in an hour?

15. $\begin{array}{r} \$49.32 \\ 86.75 \\ 90.63 \\ +\ \ 9.08 \\ \hline \end{array}$ 16. $\begin{array}{r} \$5.00 \\ -\ 1.42 \\ \hline \end{array}$ 17. $\begin{array}{r} 2096 \\ \times\ \ 9 \\ \hline \end{array}$ 18. $\begin{array}{r} 692 \\ \times\ 58 \\ \hline \end{array}$

19. $8\overline{)4008}$ 20. $943\overline{)69782}$ 21. $813\overline{)735765}$

22. If there are eighteen slices in a loaf of bread, using two slices for a sandwich, how many loaves will be needed for 27 sandwiches?

23. $9\frac{7}{12} + 3\frac{2}{3}$ 24. $24 - 6\frac{3}{4}$ 25. $7\frac{1}{2} - 2\frac{2}{3}$ 26. $\frac{7}{8} + \frac{3}{4}$

27. $3 \times \frac{1}{4}$ 28. $\frac{1}{2} \times \frac{1}{4}$ 29. $2\frac{5}{6} \times 3\frac{2}{3}$ 30. $4\frac{2}{3} \times 15$

31. $\frac{3}{4} \div \frac{1}{4}$ 32. $15 \div 1\frac{2}{3}$ 33. $\frac{7}{10} \div 3\frac{1}{5}$ 34. $\frac{3}{4} \div \frac{5}{12}$

35. It is 3/4 of a mile around a race track. How far would a car travel in going around the track twenty times?

36. A board $4\frac{1}{2}$ feet long was cut into three equal pieces. What was the length of each piece?

37. Mr. Young earns \$6,500 a year. If he spends 1/5 of his earnings for rent, how much money does he spend for rent? How much does he have left?

38. We sometimes hear a person say his salary is in five figures. If your salary is in five figures, what is the most and least you can earn?

39. If butter costs 76¢ a pound, how much will 3/4 of a pound of butter cost?

40.
$$\begin{array}{r} 390 \\ 407 \\ 596 \\ \underline{+\ 839} \end{array}$$

41.
$$\begin{array}{r} 7000 \\ \underline{-\ 2587} \end{array}$$

42.
$$\begin{array}{r} 408 \\ \underline{\times\ \ 62} \end{array}$$

43. $8\overline{)\,3352}$

44. If you were going on a three-day trip that covered 1170 miles, how many miles would you need to average per day?

45.
$$\begin{array}{r} \$47.95 \\ \underline{-\ \ 39.08} \end{array}$$

46.
$$\begin{array}{r} \$6.54 \\ \underline{\times\ \ \ 18} \end{array}$$

47. $6\overline{)\,234.42}$

47. $.78\overline{)\,.32370}$

49. An airplane is scheduled to fly 920 miles in four hours. What will be its average speed per hour?

50. In a race Harry ran fifty yards in 7.9 seconds and George ran the distance in 8.2 seconds. By how many seconds did Harry win?

BASIC MATHEMATICS II

UNIT III

PER CENT

A. Meaning of Per Cent

(SUGGESTIONS FOR TEACHING ASSIGNMENT 25)

The words per cent mean per hundred. It is another way of using common fractions and decimal fractions that have a denominator of 100. Per cent is the fraction of business just as the common fraction is the fraction of everyday use and the decimal fraction is the fraction of precise measurement.

Common fraction:	Mrs. Murray bought a $\frac{1}{2}$ pound of butter.
Decimal fraction:	Jim Murray ground the gear to .007 inch.
Per cent:	Tom Murray made a profit of 17% on the sale.

Per cent will afford the pupils another way of expressing a part of something.

There are no new mathematical principles to be learned in per cent. If a pupil understands decimals and how to compute with them, he should have a minimum of difficulty with per cents. However, the language of per cents is new.

17 out of 100

$\frac{17}{100}$

.17

All of these say the same thing. There is a fourth way of saying the same thing. This way is called per cent. In 17 per cent the numerator is 17 and the denominator (hundredths) is shown by the symbol %.

The first problem in Assignment 25 is that each student is to bring in two examples from newspapers or magazines to show the use of per cent. Read some of these aloud, or write them on the blackboard.

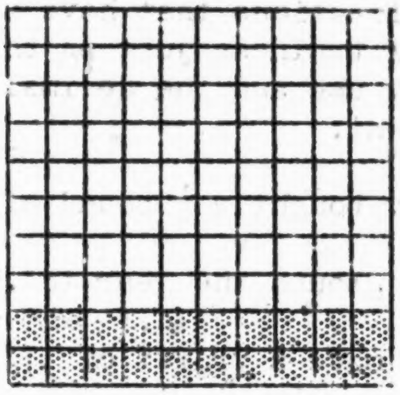
1. Community Fund has reached 89% of its goal
2. 10% down and balance in 18 months
3. Cost of living increases 3%

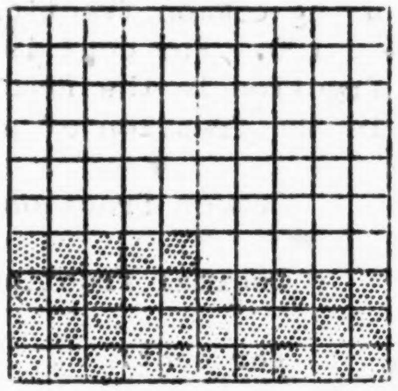
Place the following statements on the blackboard and have the students give the meanings to again emphasize the fact that per cent is hundredths:

Statement	Meaning
1. 42% of all automobile accidents occur between 6 P.M. and 6 A.M.	1. 42 of every 100 automobile accidents occur between 6 P.M. and 6 A.M.

Statement	Meaning
2. Guaranteed 100% wool	2. 100 of every 100 parts of this item are wool.
3. Now! 3% interest on savings accounts	3. For every $100.00 in your savings account you will receive $3.00 interest per year.

These problems should be followed by a graphical representation of per cent. Rule off 100 squares on the blackboard. Shade parts to show fractions, decimals, and per cents.





	Shaded	Unshaded	Shaded	Unshaded
Fraction	$\frac{20}{100}$	$\frac{80}{100}$	$\frac{35}{100}$	$\frac{65}{100}$
Decimal	.20	.80	.35	.65
Per Cent	20%	80%	35%	65%

The next step is to numerical problems of changing per cents to decimals and fractions and decimals and fractions to per cents. To change per cents to decimals, read the per cent as hundredths and then write it as a decimal. Place these examples on the blackboard:

23% = 23 hundredths = .23
67% = 67 hundredths = .67
6% = 6 hundredths = .06
99% = 99 hundredths = .99
1% = 1 hundredth = .01

To change decimals to per cents, read the hundredths as hundredths and then write the hundredths as a per cent:

.75 = 75 hundredths = 75%
.12 = 12 hundredths = 12%
.30 = 30 hundredths = 30%
.02 = 2 hundredths = 2%
.06 = 6 hundredths = 6%

To change a fraction to a per cent, change the fraction to a new fraction with the denominator 100 and then change to a per cent:

$$\frac{21}{100} = 21 \text{ hundredths} = 21\%$$

$$\frac{1}{2} = \frac{50}{100} = 50 \text{ hundredths} = 50\%$$

$$\frac{3}{4} = \frac{75}{100} = 75 \text{ hundredths} = 75\%$$

$$\frac{3}{5} = \frac{60}{100} = 60 \text{ hundredths} = 60\%$$

To change a per cent to a fraction, read the per cent as hundredths, write it as a fraction, and reduce to lowest terms:

$$50\% = 50 \text{ hundredths} = \frac{50}{100} = \frac{1}{2}$$

$$40\% = 40 \text{ hundredths} = \frac{40}{100} = \frac{2}{5}$$

$$25\% = 25 \text{ hundredths} = \frac{25}{100} = \frac{1}{4}$$

$$2\% = 2 \text{ hundredths} = \frac{2}{100} = \frac{1}{50}$$

The work in Assignment 25 is important since each problem in per cent involves changing decimals or fractions to per cents or vice versa.

B. Fractional Equivalents

(SUGGESTIONS FOR TEACHING ASSIGNMENT 26)

The students should learn the fractional equivalents for each of the following per cents:

$$10\% = \frac{1}{10} \qquad 25\% = \frac{1}{4} \qquad 50\% = \frac{1}{2} \qquad 75\% = \frac{3}{4}$$

$$20\% = \frac{1}{5} \qquad 33\tfrac{1}{3}\% = \frac{1}{3} \qquad 66\tfrac{2}{3}\% = \frac{2}{3}$$

The best way to learn the fractional equivalents for these per cents is to read each one as hundredths, write it as a fraction, and reduce the fraction to lowest terms. Example:

$$10\% = 10 \text{ hundredths} = \frac{10}{100} = \frac{1}{10}$$

$$25\% = 25 \text{ hundredths} = \frac{25}{100} = \frac{1}{4}$$

The teacher should develop each of the seven per cents above and have the students learn the fractional equivalent for each. Use flash cards or any other device that will enable the students to learn them.

C. Finding a Per Cent of a Number

(SUGGESTIONS FOR TEACHING ASSIGNMENT 27)

Finding a per cent of a number (Case I of percentage) is the simplest and by far the most commonly used of per cents.

Per cent means hundredths; so to find a certain per cent of a number you multiply by that many hundredths.

72% of $94 means 72 hundredths of $94 or .72 x $94

3% of $100 means 3 hundredths of $100 or .03 x $100

There are two steps in finding a per cent of a number:

1. Change the per cent to a decimal.
2. Multiply.

Work the following problems on the blackboard before starting Assignment 27:

25% of 48	2% of 400	12% of $92	1% of $567
48	400	$92	$567
x .25	x .02	x .12	x .01
240	8.00	184	$5.67
96		92	
12.00		$11.04	

Emphasize placing the decimal point correctly in the product.

D. Reviews

(SUGGESTIONS FOR TEACHING ASSIGNMENTS 28 AND 29)

The problems in Assignment 28 are intended to review the work in per cents. Work carefully with the students on this assignment to make sure that per cents are understood.

The problems in Assignment 29 are intended to review all the work in whole numbers, fractions, decimals, and per cents. Warn the students to be careful about doing the correct operation.

ASSIGNMENT 25

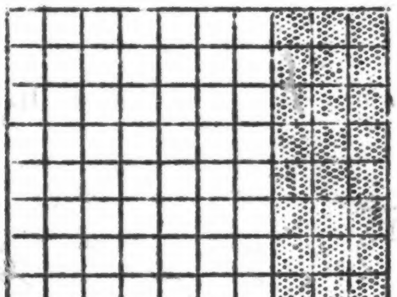
1. Bring to class two clippings from newspapers or magazines which have per cents in them.

2. For each statement below give the meaning. Part (a) has been done for you.

Statement	Meaning
a. 25% of this tire is natural rubber.	a. Of every 100 parts of the tire, 25 of the parts are natural rubber.
b. This soap is 99% pure.	b.
c. Traffic deaths are 5% below last year.	c.
d. Harry got 90% of his mathematics test correct.	d.
e. Mary saved 20% of what she earned.	e.
f. 85% of all fatal accidents occur in clear weather.	f.

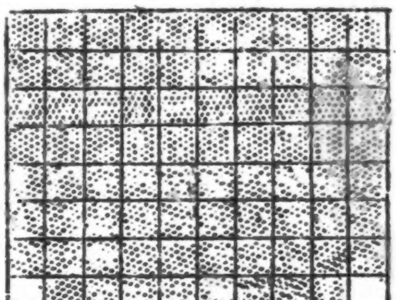
3. Below each graph write the fraction, decimal, and per cent that that indicates what part of the figure is shaded.

a.



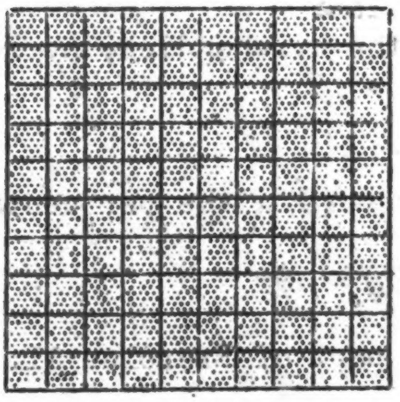
______ ______ ______

b.



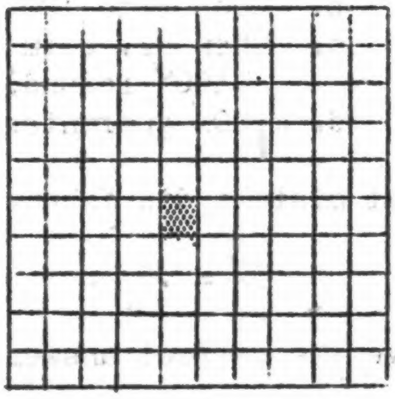
______ ______ ______

c.



______ ______ ______

d.



______ ______ ______

4. Write the fraction, decimal, and per cent that indicates the unshaded part of each figure in Exercise 3.

5. Change each of these per cents to a decimal:

a. 75%
b. 96%
c. 70%
d. 82%
e. 3%
f. 8%
g. 40%
h. 23%
i. 1%

6. Change each of these decimals to a per cent:

a. .25
b. .38
c. .18
d. .40
e. .01
f. .50
g. .02
h. .09
i. .99

7. Change each of these fractions to a per cent:

a. $\frac{27}{100}$
b. $\frac{12}{100}$
c. $\frac{3}{100}$
d. $\frac{1}{100}$
e. $\frac{99}{100}$
f. $\frac{4}{5}$
g. $\frac{3}{4}$
h. $\frac{1}{10}$
i. $\frac{1}{2}$

8. Change each of these per cents to a fraction:

a. 35%
b. 20%
c. 75%
d. 15%
e. 60%
f. 80%
g. 4%
h. 10%
i. 5%

9. Change each of the following to a per cent:

a. $\frac{25}{100}$
b. .08
c. .75
d. $\frac{1}{4}$
e. .30
f. $\frac{1}{10}$
g. .98
h. $\frac{1}{5}$

10. 100% of anything is all of it. What do each of these statements mean?

a. 100% of the class was present.
b. Cooperate 100% with the law.
c. When Mr. Slim returned the merchandise, he received a 100% refund.
d. 100% guarantee

11. What mistake did Johnny make in changing the per cents to decimals?

3% = .3
9% = .9
1% = .1

12. Give the correct answers to each part of Exercise 11.

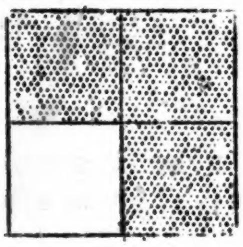
13. Fill in the missing words:

a. 38 per cent means 38______________________________.
b. Three ways to write 4% are_______, _______, and _______.
c. Per cent means__________________________________.
d. The teacher said, "All of the problems, or ______ per cent are correct."

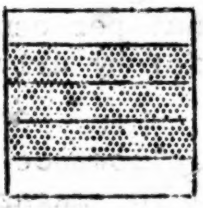
14. Write three statements in which per cent is used.

15. For each figure below write the fraction that indicates what part of the figure is shaded:

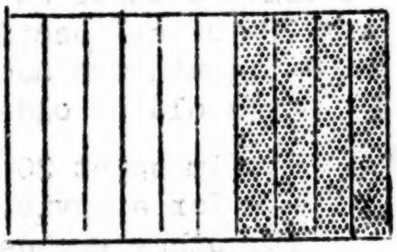
a.



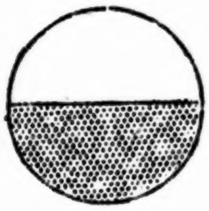
b.



c.



d.



16. Change each fraction in Exercise 15 to a per cent.

17. Write the fractions that indicate what part of each figure in Exercise 15 is unshaded. Change each fraction to a per cent.

18. When you write hundredths as a decimal, what takes the place of the denominator 100?

19. If you write hundredths as a per cent, what takes the place of the decimal point?

20. Complete the table below. The first one has been done for you.

	Fraction	Decimal	Per Cent
a.	1/2	.50	50%
b.		.04	
c.			5%
d.	1/10		
e.		.60	
f.			75%
g.	3/4		
h.		.85	
i.			99%
j.	1/20		
k.		.76	

21. Per cents are often used carelessly by persons in conversation and in radio and TV commercials. Such expressions as:

"You look 100% more beautiful,"
"The flavor of this coffee has been improved 100%,"

are examples of the improper use of the words per cent, since beauty and flavor are not measurable in per cent. In each of the following statements, tell whether the per cent has been used properly or improperly:

a. The cost of living has increased 3% since last year.
b. This soap gets clothes 50% cleaner.
c. Johnny's enthusiasm for his school work has increased 50%.
d. I feel 100% better today.
e. Steel workers received a 5% increase in wages.

22. In Exercise 10 it was explained that all of a thing is 100%. If you divide a whole thing (100%) into parts, each of the parts is a per cent of the whole thing. Example:

If drivers under 24 years of age account for 28% of all accidents, what per cent of accidents are accounted for by drivers 24 years old or older?

100% (all drivers)
-28% (under 24)
72% (24 or over)

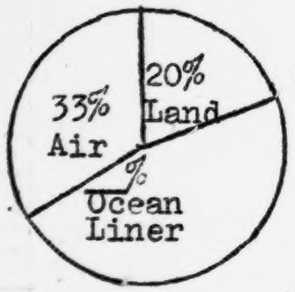
a. If Jim spent 20% of his allowance for school supplies, 20% for a movie, and 20% for magazines, what was left for other expenses?

b. A family budget allowed 12% for clothing, 15% for rent, 10% for house operation, 30% for miscellaneous expenses, and the rest for food. What per cent of the monthly income was allowed for food?

c. On a census taken in 1956, about 8% of all American families had incomes of $10,000 or more, and 40% had incomes between $5,000 and $10,000. What per cent had incomes of less than $5,000?

23. Another way to show a whole thing (100%) divided into parts is by means of a graph, either circular or bar. In each graph the entire amount is 100%.

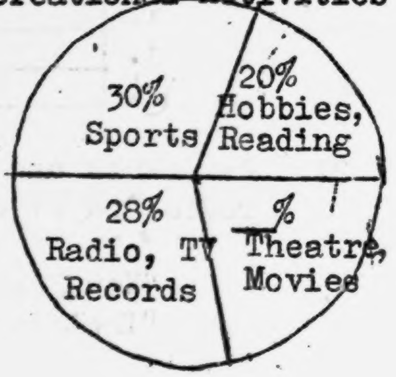
Trip Around the World



a. What is the graph about?
b. What must the per cents add up to?
c. How can you find the missing per cent? Find it.
d. In making a trip around the world, which means of transportation is used the most? The least?

24. Use the graph to answer these questions:

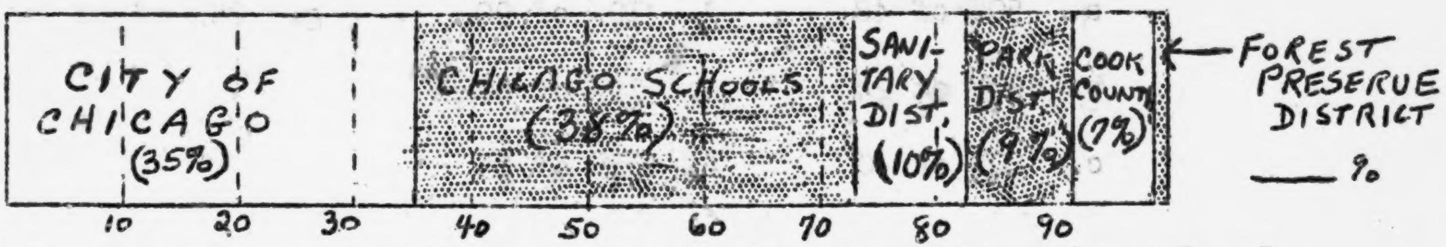
Expenditures for Recreational Activities



a. What is the graph about?
b. What must the per cents add up to?
c. Find the missing per cent.
d. On what form of recreation was the most money spent? The least?

3

25. Chicago Tax Dollar



The 100%-bar graph indicates how each dollar of tax collected by the City of Chicago was spent in 1957.

a. What should all per cents add up to?
b. Find the per cent for the Forest Preserve District.
c. What item cost the most?

ASSIGNMENT 26

1. Write the fraction equal to each of these per cents:

a. 50% b. 20% c. $66\frac{2}{3}\%$ d. 75% e. 10% f. 25% g. $33\frac{1}{3}\%$

2. Write the per cent equal to each of these fractions:

a. $\frac{2}{3}$ b. $\frac{3}{4}$ c. $\frac{1}{10}$ d. $\frac{1}{2}$ e. $\frac{1}{5}$ f. $\frac{1}{3}$ g. $\frac{1}{4}$

3. In our work in fractions we did problems like the following:

$$\frac{1}{4} \text{ of } 48 = \frac{1}{\underset{1}{\cancel{4}}} \times \frac{\overset{12}{\cancel{48}}}{1} = \frac{12}{1} = 12$$

Do each of the following problems in the same way:

a. $\frac{1}{5}$ of 20 b. $\frac{3}{4}$ of 36 c. $\frac{1}{10}$ of 70 d. $\frac{1}{3}$ of 18 e. $\frac{1}{2}$ of 40 f. $\frac{1}{4}$ of 28 g. $\frac{2}{3}$ of 24

4. By knowing the relationship between these fractions and per cents, we can solve this problem:

25% of 36

$$\text{or } \frac{1}{4} \text{ of } 36 = \frac{1}{4} \times 36 = \frac{1}{\underset{1}{\cancel{4}}} \times \frac{\overset{9}{\cancel{36}}}{1} = \frac{9}{1} = 9$$

The steps are:

1. Replace the per cent by a fraction.
2. Multiply.

Do the following problems in the same way:

a. 50% of 48
b. $66\frac{2}{3}\%$ of 24
c. 20% of 40
d. 10% of 90
e. 75% of 60
f. $33\frac{1}{3}\%$ of 15
g. 25% of 30

5. Solve the following, being careful of dollar signs and decimal points:

a. 75% of \$24
b. $33\frac{1}{3}\%$ of \$36
c. 50% of \$216.50
d. 10% of \$100
e. 20% of \$15
f. $66\frac{2}{3}\%$ of \$48

6. At a sale Mrs. Jones bought a \$5.00 tablecloth at a reduction of 20%. What was the saving?

7. A table radio that sold regularly for \$20.00 was reduced 25%. What was the amount of the reduction?

8. Of the 400 books in a library about 10% are in need of repair. How many books need repair?

9. When Ted Williams won the American League batting title in 1958 he came to bat 405 times. If he got a hit $33\frac{1}{3}\%$ of the times he came to bat, how many hits did he get?

10. Mrs. Conlon had twelve shirts to iron for her family. She finished 75% of them before dinner. How many shirts had she ironed?

11. There are 325 million radios in the world. If 50% of these are in the United States, how many radios are there in the United States?

12. The United States Navy football field at Annapolis will seat about 30,000 people. The Chicago Stadium will seat about $66\frac{2}{3}\%$ as many people. What is the seating capacity of the Chicago Stadium?

13. In a championship basketball game a total of 140 points were scored by both teams. The winning team scored 75% of the points.

    a. How many points did the winning team score?
    b. What per cent of the points did the losing team score?
    c. How many points did the losing team score?

14. The goal for the Red Cross in a certain town was \$400.00. At the end of the first month they had collected 25% of their goal. How much had they collected?

15 The area of Russia is almost nine million square miles. The area of the United States is $33\frac{1}{3}\%$ as large. How large is the United States?

16. There were thirty students in the Basic Mathematics class and 20% of them failed. How many failed? How many passed?

ASSIGNMENT 27

1. Change these per cents to decimals:

   a. 75%
   b. 3%
   c. 96%
   d. 8%
   e. 82%
   f. 70%
   g. 40%
   h. 24%
   i. 5%

2. In each problem below the number in the answer is correct, but it is necessary to put in the decimal point:

a.	b.	c.	d.
$47 x 34 $1598	53 x .85 4505	306 x .50 15300	$72 x .29 $2088

e.	f.	g.	h.
$57 x .37 $2109	$98 x .45 $4410	$603 x .39 $23517	$1305 x .80 $104400

3. Find:

   a. 28% of 75
   b. 45% of 319
   c. 5% of 357
   d. 32% of 98
   e. 7% of 3,489
   f. 53% of 632
   g. 98% of 576
   h. 4% of 896
   i. 8% of $598
   j. 65% of $1950
   k. 2% of $92
   l. 24% of $2485

4. A carpenter has been earning $500 a month. His wages are increased 8%. How much increase does he get?

5. In a certain company all the office employees were given a 5% increase in pay. Fill in the table showing the amount of increase and the new salary. Part (a) has been done for you.

Position	Salary (per month)	Amount of Increase	New Salary
a. Office Manager	$650	$32.50	$682.50
b. Section Manager	$500		
c. Stenographer	$450		
d. Typist	$350		
e. File Clerk	$300		

a.

$650 x .05 $32.50	$650.00 + 32.50 $682.50

6. Mrs. Smith bought a dress costing $17. The sales tax was 2% of the cost of the dress. How much sales tax did she pay?

7. The price of a new car is $2150. If Mr. Long pays 40% of the price of the car immediately, how much does he pay?

8. Mr. Kurris feels he can afford to pay 20% of his salary for rent. If his salary is $5500 a year, how much can he pay a year for rent? How much is this a month?

9. An employer deducts 4% of his secretary's salary for a retirement fund. If her salary is $275 a month, how much does he deduct?

10. Mrs. Robinson bought an automatic washer for $249. She paid 20% immediately and the rest in monthly payments. How much did she pay immediately?

11. Mrs. McCarthy bought a hat at a sale. The regular price was $8, but the price was reduced 40%. How much was the hat reduced? How much did the hat cost?

12. A salesperson often receives a bonus (extra pay). This bonus is given in the form of a per cent of his sales. If a person's sales amounted to $450 and he received a 5% bonus, the bonus would be:

$$\begin{array}{r} \$450 \\ \underline{\times\ \ .05} \\ \$22.50 \end{array}$$

Find the bonus for each salesperson in the table if each receives a 5% bonus:

Name	Sales	Bonus
John Hay	$196	
Mary Stone	$498	
Jack Small	$347	
Joe Smith	$209	
Helen Troy	$710	
Nellie Fox	$900	

13. An ad in the newspaper stated: "Everything reduced 25%." Find the amount each article was reduced and the new price of the item. The first one has been done for you.

Item	Regular Price	Reduced	New Price
Radio	$23	$5.75	$17.25
Toaster	$12		
Vacuum Cleaner	$49		
Camera	$69		
Tool Kit	$27		
Roller Skates	$ 6		
Watch	$38		
Lamp	$13		

Radio

$$\begin{array}{r} \$23 \\ \underline{\times.25} \\ 115 \\ \underline{46\ } \\ \$5.75 \end{array}$$

$$\begin{array}{r} \$23.00 \\ \underline{-\ 5.75} \\ \$17.25 \end{array}$$

14. An automobile decreases in value each year. This is called depreciation. If a man paid $2850 for a new car and two years later it had depreciated 40%, by how much had it depreciated?

15. In a certain school 8% of the students dropped out of school in a year. If there were 2,500 students in the school, how many dropped out?

16. Jim and Harry played 32 games of handball during the summer. Jim won 25% of the games.

    a. How many games did Jim win?
    b. What per cent of the games did Harry win?
    c. How many games did Harry win?

17. Rose saves 20% of the money she earns. One week she earned $12. How much did she save?

18. When the new models of automobiles come out it is possible to get the old models for less money. A car dealer sold Mr. Schultz a new car at 20% less than the original price because the new models were coming out. If the original price was $1,950, how much did Mr. Schultz save?

19. A new piano cost $290. When it was delivered Mrs. Hartsect paid 25% of the cost. How much did she pay when it was delivered? How much was left to be paid?

20. Mr. Hawkes bought a television set which originally was valued at $295. He paid only 75% of this amount. How much did Mr. Hawkes pay for the TV set?

21. Records show that 78% of accidents in which people are killed occur in dry weather. In 1957, 38,500 people were killed in automobile accidents. How many of these were in dry weather?

22. On August 1 the Chicago Cubs had played 100 games. They had won 50% of these games. How many games had they won?

23. Mr. Sloan paid $2450 for his car. After two years he was offered 50% of what he paid for the car on a trade for a new car. How much money was he offered for the car?

24. Mr. Tuttle earns $4500 a year and gives 9% of his money to his church. Mr. Unger earns $4900 a year and gives 8% to his church. Which man gives the larger sum of money, and how much more does he give than the other man?

25. There is a Federal tax of 10% on cameras, films, furs, jewelry, pens, lighters, sporting goods, telephones, and travel tickets. Find the amount of tax and the total price of each item in the table. The first one has been done for you.

Item	Cost	Tax	Total
Camera	$ 49	$4.90	$53.90
Fur coat	$279		
Necklace	$ 7		
Pen	$ 3		
Tennis racquet	$ 9		
Bus ticket	$ 24		

Camera

$$\begin{array}{r} \$49 \\ \underline{\times .10} \\ 00 \\ \underline{49} \\ \$4.90 \end{array} \qquad \begin{array}{r} \$49.00 \\ \underline{+\ \ 4.90} \\ \$53.90 \end{array}$$

26. The enrollment of a certain school has increased 3% in the last year. If the enrollment a year ago was 2,700, what is the increase in enrollment? What is the new enrollment?

27. At the beginning of the football season, the coach of a team said he would be pleased if his team won 75% of their games. If the team played 12 games, how many should they win to make the coach happy?

28. About 70% of a hog is usable meat. If a hog weighs 270 pounds, how many pounds of usable meat will be realized when he is slaughtered?

29. Bob Turley pitched 28 games for the New York Yankees in 1958. He won 75% of these games. How many games did he win?

30. Of the 9,350 pedestrians killed by automobiles in a recent year, 62% were killed at intersections. How many people were killed at intersections?

31. Mr. Cole bought a battery guaranteed to last 24 months. It lasted 75% of this time. How long did it last?

32. In the United States there are 40 National Parks and National Military Parks. Fifty-five per cent of these are west of the Mississippi River. How many parks are west of the Mississippi? How many are east of the Mississippi?

33. Jack's bicycle cost $50 when it was new. A dealer has offered him 45% of the price he paid. How much did the dealer offer Jack?

34. A merchant offered skates at 15% off. What must Virginia pay for a pair marked $8?

35. An appliance store reduced each of these items 20%. Find the amount the price was reduced on each of these items, and find the reduced price:

Item	Price	Amount Reduced	New Price
Electric Stove	$260		
AM-FM Radio	$ 89		
Television Set	$279		

36. There is a state sales tax of 3% on most purchases made. Find the sales tax on each item:

a.	Chair	$11
b.	Luggage	$23
c.	Gloves	$ 3
d.	Lamp	$19

37. Mary ordered 60 tulip bulbs. At least 85% of them are guaranteed to grow. How many should Mary expect to grow?

38. A survey was made of the students in a ninth grade English class to find out what sports they liked to participate in. There were 40 pupils in the class. The table at the right indicates what per cent of the class participated in each sport. Find the number of pupils who participated in each sport.

Sport	Per Cent
Baseball	70%
Football	15%
Swimming	35%
Skating	10%
Bowling	5%

39. A basketball team played 20 games and won 70% of them. How many games did it win?

40. In a school of 700 pupils, 53% were girls. How many of the pupils were girls? Boys?

41. What would you have to pay for a $30 suit on sale at a reduction of 40% from the regular price?

42. Starting in 1960, both the worker and his employor will have to pay 3% of the worker's wages for social security. For each of the persons below, find how much the worker will have to pay for social security:

a. Mr. Insull $450.00 a month
b. Mrs. Watts $375.00 a month
c. Mr. Edwards $290.00 a month
d. Mr. Simmons $500.00 a month

ASSIGNMENT 28

1. Write these per cents as fractions:

8%　67%　3%　16%　50%

2. Write these per cents as decimals:

25%　5%　92%　1%　19%　3%

3. Write these decimals as per cents:

.44　.95　.02　.50　.75　.09

4. Write these fractions as per cents:

$\frac{29}{100}$　$\frac{3}{100}$　$\frac{50}{100}$　$\frac{6}{100}$　$\frac{1}{100}$

5. In row (a) change per cents to fractions, and in row (b) change fractions to per cents:

a. 50%　20%　$66\frac{2}{3}\%$　75%　10%　25%　$33\frac{1}{3}\%$

b. $\frac{2}{3}$　$\frac{3}{4}$　$\frac{1}{10}$　$\frac{1}{2}$　$\frac{1}{5}$　$\frac{1}{3}$　$\frac{1}{4}$

6. Find:

a. 30% of 40
b. 1% of 370
c. 12% of $500
d. 4% of $750
e. 26% of 15
f. 5% of $4000
g. 6% of $250
h. 17% of $200
i. 60% of $1500

7. What is 100% of each of these numbers?

a. 73
b. 2
c. 913

8. In solving each of these problems, change the per cent to a fraction:

a. $33\frac{1}{3}\%$ of 24
b. 75% of 200
c. 50% of $400
d. 10% of 70
e. 25% of 48
f. 20% of 50

9. Complete the following table:

Fraction	Decimal	Per Cent
1/2		
	.13	
		42%
1/3		
	.75	
		20%

10. In a particular community, 28% of the high school graduates go to college. If the average size of the graduating class is 150 students, how many go on to college?

11. A man bought a piece of land several years ago for $2,000. Now he wants to sell it for 20% more than he paid for it. Find the amount he should sell it for.

12. A typewriter was reduced 20% for immediate sale. Find the price if it originally cost $89.

13. Car owners allow 20% a year depreciation on their cars. If you paid $2850 for a car, how much would it be worth at the end of the year?

14. If you pay certain utility (water, gas, light) bills before they are due, you save money. The amount you save is stated as a per cent of your bill. Find how much you save if you receive a 5% saving on each of the following:

a. Electric bill $12
b. Water bill . . . . . . $ 3
c. Gas bill . . . . $ 4

15. Circle each number below that is more than 80% of 92:

61 48 97 123 95 68

16. If 47% of the oil produced in the United States is produced in Texas, and 20% of it is produced in California, what per cent is left for all other states?

17. In a game last season the Chicago Bears professional football team gained a total of 440 yards. Of this amount 40% was by forward passes. How many yards were gained by forward passes?

18. A real estate salesman helped Mr. Wright sell his house. For his help Mr. Wright paid him 5% of the price of the house. If the house sold for $19,000, how much did the salesman get?

19. In a certain school last year 57% of the girls belonged to the Pep Club. It has increased this year to 83%. What is the increase in per cent?

20. About 20% of the weight of honey is water. A 32-ounce jar of honey contains about how many ounces of water?

21. Only a small part of the money needed to support a university comes from the students' tuition. At a certain university 16% of the $400,000 needed last year came from students' tuition. How much came from students' tuition?

22. Mrs. Fulmer bought some new furniture for her dining room. She paid $379 for it, plus a sales tax of 3%. What did Mrs. Fulmer pay in all?

23. If 20% of the 110 tulips that the biology class planted were red tulips, how many red tulips did they plant?

24. Mr. Wallace plans to save 8% of his salary. How much should he save in a year if his salary is $5,600?

25. The Merchandise Mart in Chicago is the world's largest commercial building, and is exceeded only by the Pentagon in Washington as the world's largest building. The area of the building is 4,083,000 square feet. Twenty-five per cent of this area is for corridors, elevators, etc. How many square feet is devoted to corridors, elevators, etc.?

26. An automobile decreases in value each year. This is called depreciation. Mr. Helm paid $2,450 for a new car. At the end of the first year it had depreciated 20% in value. How much did it depreciate? How much was the car worth at the end of the first year?

27. If a certain grade of milk contains 3% butterfat, find the amount of butterfat in 560 pounds of milk.

ASSIGNMENT 29

1. $\begin{array}{r} 2468 \\ 4659 \\ 3032 \\ +\ 5892 \\ \hline \end{array}$

2. $\begin{array}{r} 4\frac{3}{10} \\ +\ 3\frac{7}{10} \\ \hline \end{array}$

3. $\begin{array}{r} 4.519 \\ +\ 8.587 \\ \hline \end{array}$

4. $\begin{array}{r} 30000 \\ -\ 19473 \\ \hline \end{array}$

5. $15\frac{1}{4}$
$-\ 6\frac{5}{8}$

6. 8.375
$-\ 3.207$

7. Reduce to lowest terms:
$\frac{20}{32}$ $\frac{9}{24}$ $\frac{15}{20}$

8. 683
x 947

9. 9.07
x 60.3

10. $55\overline{)\,2717}$

11. $39\overline{)\,27503}$

12. Halley's Comet last appeared in our skies in 1910. Astronomers predict it will appear 76 years later. In what year will the comet appear next? How many years do we have to wait to see it?

13. Mr. Silver hired two men to help him build his garage. He paid the men $2.00 an hour. Each man worked 20 hours. How much did Mr. Silver pay these men altogether?

14. Jim receives an allowance of $8.00 a week. He puts 1/4 of it in a bank to save for his college education. How much does he put in the bank each week?

15. $4.85
6.70
3.58
+ 3.62

16. 21,503
$-\ 2,775$

17. $812.60
$-\ 573.80$

18. $.68
x .50

19. 7089
x 38

20. $4\frac{1}{5} \times 2\frac{1}{3}$

21. $4\frac{1}{2} \div 1\frac{1}{2}$

22. 9.08
x 3.4

23. $4\overline{)\,2.20}$

24. $.45\overline{)\,.0135}$

25. $\frac{5}{12} \div \frac{1}{4}$

26. $4 \div 1\frac{1}{2}$

27. $.48\overline{)\,7.008}$

28. $3.8\overline{)\,1.52}$

29. Write as decimals: 15% 74% 2% 9%

30. Write as per cents: .25 .03 $\frac{27}{100}$ $\frac{2}{100}$ .99

31. Find:
a. 44% of $ 35
b. 25% of $315
c. 60% of $ 35
d. 15% of $120

32. In a recent year in Cook County, 655 people were killed in traffic accidents. Of these 430 were killed in Chicago. How many were killed in Cook County outside Chicago?

33. We think of coffee in terms of so much per pound, but we drink it by the cup. If a pound of coffee makes 40 cups, how much will one cup cost if a pound costs 80¢?

34. Five girls made eight badges from $2\frac{2}{3}$ yards of ribbon. How much ribbon was in each badge?

35. Ninety-seven per cent of the world's diamonds come from Africa. What per cent of the diamonds come from the rest of the world?

36. If there are 40 students in your class and 10% are absent today, how many students are absent today?

37. $$\begin{array}{r} 4\frac{1}{2} \\ +\ 3\frac{5}{8} \\ \hline \end{array}$$

38. $$\begin{array}{r} 14 \\ -\ 8\frac{7}{8} \\ \hline \end{array}$$

39. $2\frac{1}{2} \times 3\frac{1}{3}$

40. Write the largest possible number using the figures 8, 5, 0, and 3.

41. Find the missing numbers in the magic squares:

$\frac{9}{16}$	$\frac{5}{8}$	
	$\frac{8}{16}$	$\frac{3}{4}$
$\frac{11}{16}$		$\frac{7}{16}$

5.2	3.8	4.8
	4.6	
4.4		4.0

42. During one week 30,000 persons were expected to visit an amusement park. The first day 6,400 persons visited the park. How many were expected the rest of the week?

43. A truck is carrying 38 rolls of roofing material. Each roll weighs 65 pounds. What is the total weight of the load?

44. At the rate of 40¢ for the first three minutes and 10¢ for each additional minute, find the cost of the following phone calls:

    a. a 4-minute call
    b. a 5-minute call
    c. a 7-minute call

45. The Panama Canal shortens by many thousands of miles the distance between Atlantic and Pacific Ocean ports. In 1957 ships carried 49,702,000 tons of cargo through the canal. How much increase is this over 1947, when 23,974,956 tons were carried?

46. Alaska and Hawaii have become our 49th and 50th states. The following gives some idea of the size and population of our two new states:

	Size Square Miles	Population
Alaska	571,065	161,000
Hawaii	6,423	526,000

a. How much larger is Alaska than Hawaii in area?
b. How much larger is Hawaii than Alaska in population?
c. Is Alaska about 100 times as large as Hawaii?
d. Are there more than three times as many people in Hawaii as there are in Alaska?

47. At a summer resort for one week there were 48 persons vacationing. The weekly rate was \$55 per person. What was the total paid by the guests?

48. Circle the fractions below that equal $\frac{3}{4}$:

$\frac{5}{6}$ $\frac{9}{12}$ $\frac{10}{12}$ $\frac{18}{24}$ $\frac{10}{16}$ $\frac{15}{20}$ $\frac{24}{32}$ $\frac{16}{24}$ $\frac{10}{20}$

49. A DC-7 plane uses about 550 gallons of gasoline per hour. How much gasoline does it use on a six-hour flight?

50. Ruth put six pictures on each page of her scrapbook. She has filled $3\frac{1}{2}$ pages. How many pictures has she put in the book?

BASIC MATHEMATICS II

UNIT IV

PRACTICAL APPLICATIONS OF MATHEMATICS

A. Overview of Unit IV

(SUGGESTIONS FOR TEACHING ASSIGNMENTS 30 to 36)

The work in Unit IV differs from the previous units in that the information which ordinarily might be placed in the teachers' section has been put in the students' section.

The work of this unit deals with the practical everyday problems that students in Basic Mathematics will be facing in the next few years. The exercises have been placed throughout the unit so that the problems occur immediately after a new item has been presented. Most of the reading should be done aloud so that any points which are not understood can be explained.

There are two reviews in the unit, Assignments 33 and 36.

There are booklets available which give many helpful hints on the items covered in this unit. These are available from business concerns in the city at little or no cost.

ASSIGNMENT 30

Simple Budgeting

A budget is a plan for spending. A family should plan its expenditures so that all necessities and at least a few luxuries can be secured, and so that some of the income can be saved for later in life or in the event of illness or other emergencies.

After leaving high school you should be concerned with your ability to live within your income and to provide for the future. A definite plan of spending is especially important during the first years of earning.

From the amount of money you earn your employer deducts a certain amount for Federal Income Tax and Social Security. The amount left is called your "take-home pay." A budget is based upon this "take-home pay."

1. In each problem find the "take-home pay." Part (a) has been done for you.

	Name	Earnings	Income Tax	Social Security	Take-home Pay
a.	Harry Brown	$175	$35.00	$4.38	$135.62
b.	John Johnson	$220	$44.00	$5.00	
c.	Mary Sykes	$280	$46.00	$5.00	
d.	Helen Ford	$160	$32.00	$4.00	
e.	Charles Levin	$450	$90.00	$5.00	

a.
```
  $35.00
+   4.38
  $39.38

 $175.00
-  39.38
 $135.62
```

2. Who earned the most money? Who paid the largest income tax? Why is this true?

In making a budget some families make their own plan and some families follow a plan that has been worked out for them. The following items must be included in every budget:

Housing and household operation (rent or mortgage, gas, electricity, telephone)
Food (groceries, dairy products, and meats)
Clothing (original cost as well as upkeep)
Transportation (operating a car, bus fare)
Medical and personal expenses (doctor bills, contributions to charity)
Recreation and education (attending ball game, buying a book)
Savings (includes insurance)

Every expense must fit into one of these seven groups.

3. Under which heading should you place each item in the list below?

a. electric light bill
b. gas for car
c. supplies for family picnic
d. tooth extraction
e. Sunday church offering
f. interest on mortgage
g. new dress for mother
h. purchase of U. S. Savings Bond

Some people believe that following a budget requires too much arithmetic. A budget need not be complicated. If you have mastered the work in Basic Mathematics up to this point, you can plan a budget. The amounts spent for each of the six items in the budget are usually given in per cents. The table below gives typical budgets for average families for a year.

Take-home Pay	Housing and Household Operation	Food	Clothing	Medical and Personal Expenses	Transportation	Recreation and Education	Savings
a. $3000-$3999	27%	33%	11%	8%	15%	6%	-
b. $4000-$4999	26%	31%	12%	7%	15%	6%	3%
c. $5000-$5999	25%	29%	13%	6%	15%	7%	5%

Using the table, answer the following questions:

4. If your take-home pay is $3600, what per cent of it would you spend for food? Transportation?

5. If your take-home pay is $4863, what per cent would you spend for housing? Clothing? Savings?

6. If your take-home pay is $5012, what per cent would you spend for medical and personal expenses? Recreation and education?

7. Which item in the budget is allotted the same per cent no matter what your take-home pay is?

8. In Part (a) of the table ($3000-$3999), the space for savings is blank. How do you explain this fact?

9. Take all the percentages in Part (a) and add them. What is the total of all the per cents?

10. Add the per cents for Part (b) and **for Part(c).** Can you explain why the sum in each case is 100%?

11. Mark each statement true or false:

a. As your take-home pay increases your per cent of savings increases.
b. As your take-home pay increases the per cent spent on housing increases.
c. The more money you earn, the higher the per cent spent on food.
d. The more money you earn the higher the per cent spent on transportation.

12. The next step in budgeting is to determine how the take-home pay is distributed. Use the chart at the right. The per cents are from the table used in Exercises 4 to 11. The take-home pay ($3,600) is in Part (a) ($3,000-$3,999). We use the per cents in Part (a). To find the amount spent for housing we find 27% of $3,600.00.

TAKE-HOME PAY $3,600		
Item	%	Amount
Housing	27%	$ 972.00
Food	33%	$1,188.00
Clothing	11%	
Transportation	15%	
Medical & Personal Expenses	8%	
Recreation & Education	6%	
Savings	0%	
TOTALS		

Housing	Food
$3,600.	$3,600
x.27	x.33
25200	10800
7200	10800
$972.00	$1,188.00

Find the amounts spent for the other four items. To check your problem, add the per cents and add the amounts of money. What should be the total of the per cents? The amounts of money?

13. The table at the right is to be filled in for take-home pay of $4,900. In this case we use Part (b) of the table to get the per cents. The amount spent for housing is 26% of $4,900.

TAKE-HOME PAY $4,900		
Item	%	Amount
Housing	26%	$1,274.00
Food	31%	
Clothing	12%	
Transportation		
Medical & Personal Expenses		
Recreation & Education		
Savings		
TOTALS		

$4,900.
x.26
29400
9800
$1,274.00

Find the missing per cents and amounts. To check, the per cents should total 100% and the amounts should total $4,900.

14. For each of the following take-home pays, draw a chart as was done in Exercises 12 and 13. Remember to add the per cents and the amounts to check the problems:

a. $5460 b. $3340 c. $5995

15. Budgets must be flexible. If a person moves from Florida to Minnesota, what item in the budget would change considerably?

16. In which of the following occupations is income easiest to determine? Hardest to determine?

a. Artist b. Painter c. Police officer d. Member of dance orchestra

One of the seven items in the budget we have been using is savings. There are a number of ways in which you can save money. Here is the way one man saved his money (as told in Chicago newspapers, July 1959):

> "A 78-year old city sidewalk inspector who didn't trust banks lost his wallet last Wednesday. The wallet contained his life savings, $35,000."

This man lost confidence in banks in the depression of 1932 when banks closed and people lost their life savings. Today, the money you place in a bank is protected by the Federal Deposit Insurance Corporation (FDIC). Through this agency the Federal government guarantees to pay any losses by depositors up to $10,000. In a bank your money is safe and can earn interest also. A savings and loan association in one of Chicago's suburbs advertises: "It's not the amount you save, but the starting that counts."

Within the next few years you will be getting that first pay check. Keep the following in mind:

1. Start a budget immediately.
2. Pay for the necessities (food, clothing, shelter) first.
3. Try to save a little out of each check and put it in a safe place (in a bank or in U. S. Savings Bonds).

ASSIGNMENT 31

Borrowing Money

The ways in which people borrow money vary from "Johnny, lend me a dime," to going to a bank for a loan of $10,000 to purchase a home. You can borrow money directly from a bank, loan company, or credit union, or you can borrow money by opening a charge account, buying on the installment plan, using the lay-away plan. This assignment deals with the items just mentioned. No matter which of these items you may use in later life, keep these points in mind:

1. Borrow only after carefully considering all factors involved.
2. Know from whom you are borrowing.
3. Make your payments promptly in order to establish a good credit rating.
4. Try to restrict installment purchases so that as a rule you are paying for only one item at a time.

If you borrow money, one place to borrow is from a bank. Banks usually charge the lowest rates of interest, typically 6% a year. In order to borrow from a bank you must have a good credit rating. To obtain a good credit rating you must pay your bills promptly and have steady employment. Study carefully the following example:

John Aaron borrowed $300.00 from a	$300
bank at 6% interest a year. How	x.06
much interest did he pay for a year?	$18.00 interest

Work each of the following problems carefully:

1. How much interest would Jack Hanson pay on $500 at 6% for a year?

2. Mary Johnson borrows $2500 from The First National Bank at 5% interest. How much interest does she pay in a year?

3. In each of the following, find the amount of interest for one year:

	Amount Borrowed	Rate of Interest	Amount of Interest
a.	$ 900.	6%	
b.	$ 800.	4%	
c.	$2400.	7%	
d.	$1350.	6%	
e.	$2650.	7%	
f.	$3400.	5%	
g.	$8500.	4%	
h.	$3640.	5%	

4. In some cases you pay the interest when you borrow the money. What you do is subtract the interest from the money borrowed. Applying this to Part (a) of Exercise 3:

$900. — x.06 — $54.00 interest

$900 — - 54 — $846 amount of money received

If you pay the interest when you borrow the money, find the amount you will receive in each part of Exercise 3.

To find the interest for more than one year or for part of a year, you find the interest for a year and multiply by the number of years or the part of a year that is involved in your loan.

$3,000 at 5% for 3 years

$3000
x.05
$150.00
x 3
$450.00 for 3 years

$5600 at 4% for 3 months

$5600
x.04
$224.00

3 months = $\frac{3}{12}$ or $\frac{1}{4}$ year

$$\$\overset{56}{\cancel{224}} \times \frac{1}{\underset{1}{\cancel{4}}} = \$56 \text{ for 3 months}$$

5. Find the interest in each of the following:

	Amount Borrowed	Rate of Interest	Time	Amount of Interest
a.	$ 450	5%	3 years	
b.	$ 700	6%	2 years	
c.	$ 950	4%	5 years	
d.	$ 200	5%	6 months	
e.	$3000	6%	2 months	
f.	$2400	5%	3 months	
g.	$3600	6%	4 months	

A credit union is an association that is formed within a company or group to help its members save money and also to lend money to them when they need to borrow small amounts. Members save money by buying shares in the credit union. Shares usually are sold at $5.00 or $10.00 a share. Unions earn money by charging interest on money loaned. The rate of interest is usually 1% per month or less. Earnings after expenses are paid out as dividends.

Have you ever heard or read the following advertisements:

> "Money on your signature only."
> "Everybody needs money sometime."
> "Phone now. Your money will be ready
> when you come in."

You recognize these as the slogans of some finance companies. There are many loan companies licensed to lend money to individuals. In Chicago there are a number of pages in the telephone directory listing loan companies. Is there one in your neighborhood? They require less security than a bank and since this is so they are permitted by law to charge a higher rate of interest. When you obtain money on your signature only, you give the finance company permission to take part of your salary in case you do not, or can not, pay back the money you owe. This is called garnishing your wages.

The finance companies publish their rates in folders and in newspaper ads. The table shows typical payments charged by a finance company.

Amount Borrowed	6 Monthly Payments	12 Monthly Payments	15 Monthly Payments	18 Monthly Payments
$50	$9.25	$5.05	-	-
$100	$18.50	$10.10	$8.45	$7.35
$200	$36.86	$20.05	$16.70	$14.00
$300	$54.92	$29.70	$24.70	$21.35
$500	$90.15	$48.20	$39.85	$34.70

6. How much would you pay each month if you borrowed $50 for 12 months?

7. Joe Crow borrowed $100 for 15 months. How much did he pay each month?

8. In each case tell how much you would pay each month on the following loans:

a. $300 - 15 months
b. $200 - 6 months
c. $500 - 18 months
d. $50 - 6 months
e. $100 - 15 months
f. $300 - 12 months
g. $100 - 6 months
h. $200 - 15 months
i. $500 - 6 months

The next step is to figure out how much money it costs to borrow the money, or in other words the interest. Look at the table.

$50 for 6 months costs $9.25 a month

$9.25 per month
x6 months
$55.50 amount paid back

$55.50 amount paid back
- 50.00 amount borrowed
$ 5.50 interest

$200 for 15 months costs $16.70 a month

$16.70 per month
x15 months
8350
1670
$250.50 amount paid back

$250.50 amount paid back
- 200.00 amount borrowed
$ 50.50 interest

9. Make a new table like the original but in this case fill in the amounts of interest paid. The two parts worked out on the top of this page have been entered in the table. You fill in the rest of the table.

Amount Borrowed	6 Monthly Payments	12 Monthly Payments	15 Monthly Payments	18 Monthly Payments
$50	$5.50			
$100				
$200			$50.50	
$300				
$500				

a. In which case do you pay the most interest?
b. In which case do you pay the least interest?

10. Mr. Jenkins was trying to decide where to borrow $100 for 12 months in order to pay some bills that had accumulated. He gathered the following information:

Bank	**- $8.86 a month**
Credit union	**- $9.15 a month**
Loan company	**- $9.75 a month**

a. Find how much interest he would have to pay in each case.
b. Which agency charges the most interest? Least interest?
c. What other factors must be considered?

11. What are the advantages and disadvantages of the various kinds of places where you may go to borrow money?

12. Finance companies sometimes advise people to combine all their bills together and borrow money to pay off all the bills, and then have only one payment to make each month. Discuss this advice.

If you have a loan company in your neighborhood, stop in and ask for a pamphlet stating their rates. Bring it to class so it can be shown and discussed with other members of the class. Stop at a bank and, if possible, at a credit union office to get information about their rates. Remember that the rates charged by loan companies are not illegal, but the rates are high compared to banks.

If it ever becomes necessary for you to borrow money, keep the following points in mind:

a. Do not buy anything you cannot afford.
b. Buy only from reputable people.
c. Never sign any paper or receipt unless it is
   completely filled in and you know what it means.

There are times when people are in need of an expensive item such as a stove, refrigerator, automobile, or washing machine. People cannot always afford to pay $200 or $300 all at once for an item. This leads to what we call buying on the installment plan or time-payment plan. A certain part of the price is paid at the time the item is bought. This is called the down payment. The balance of the cost is paid in equal monthly payments. For the privilege of spreading the cost over a period of time, or paying "on time," a charge called a carrying charge or service charge is added to the cost of the item which is purchased. The carrying charge is found by subtracting the cash price from the installment price. Example:

A refrigerator costs $189. If you buy it on the installment plan it will cost $219. What is the carrying charge?

$219 installment price
189 cash price
$ 30 carrying charge

13. Mrs. Hassett bought a new stove on the installment plan for $159.95. If she had paid cash, the stove would have cost $139.95. What was the carrying charge?

14. John Elston bought a set of golf clubs on the installment plan for $67.50. If he had paid cash, the clubs would have cost $59.95. Find the carrying charge.

15. In the table find the carrying charge on each item:

Item	Installment Price	Cash Price	Carrying Charge
a. Watch	$54.13	$49.95	
b. Radio	$39.84	$37.00	
c. Furniture	$314.68	$289.95	
d. Dryer	$216.00	$189.59	
e. TV set	$244.00	$229.95	

When you purchase an item on the installment plan, the store or company that you buy from tells you the amount you must pay each month. From this you can find the carrying charge which is what such companies call the charge for installment buying. Example:

> Mrs. Arson can buy a refrigerator for $259.00 cash or on the installment plan she can pay $40 down and $21 a month for one year. Find the carrying charge.

$21 a month
x12 months (1 year)
42
21
$252
+ 40 down payment
$292 installment price
259 cash price
$ 33 carrying charge

16. A wrist watch selling for $15 down and $10 a month for 6 months can be purchased for $65 cash. Find the carrying charge.

17. A TV set may be purchased for $395.95 cash, or by paying $60 down and $15 a month, with two years to pay. What is the carrying charge?

18. A sectional sofa was advertised for $250 cash or $25 down and $20 a month with 1 year to pay. Find the carrying charge.

19. A sewing machine worth $75.95 can be purchased on the installment plan for $5.00 down and $5.00 a month for 17 months. What is the carrying charge?

20. In each of these problems you pay more on the installment plan. Why do people buy on the installment plan?

21. Find the carrying charge in each case:
(The first one has been done for you.)

Item	Cash Price	Down Payment	No. of Monthly Payments	Amount of each Payment	Carrying Charge
a.Furniture	$259.00	$39.75	12	$21.00	$33.00
b.Hi-Fi Set	$169.95	$40.00	18	$ 8.00	
c.Typewriter	$ 65.00	$10.00	12	$ 5.00	
d.Stove	$175.00	$40.00	12	$13.00	
e.Clothes	$ 89.00	$12.00	12	$ 7.00	

Furniture -

$21 a month
x12 monthly payments
42
21
$252
+ 40 down payment
$292 installment price

$292 installment price
- 259 cash price
$ 33 carrying charge

22. What does the $33 carrying charge pay for?

23. A radio was priced for cash at $42.30. The payment plan as advertised was $2.00 down and $1.00 per week for 43 weeks. How much more would the radio cost when purchased on the installment plan?

24. List as many advantages and disadvantages as you can for installment purchases.

25. If 1% of installment purchases are reclaimed, how many items are reclaimed by a store that made 2,400 installment sales in a year?

26. Experts agree that people should spend no more than 10% of their income for making payments on the installment plan. In each case below find the maximum amount each family should spend on installment payments:

a. The Hart family - income $6,200 a year
b. The Swartz family - income $7,450 a year
c. The McDade family - income $4,980 a year
d. The Williams family - income $5,860 a year

27. Why does a purchase cost you more on the installment plan than if you pay cash?

28. If you wanted to purchase an item but you did not have enough money, where would you go to get the money and what might influence your choice?

a. Loan company
b. Credit union
c. Bank
d. Installment plan

29. Why do you think loan companies advertise that you should telephone for a loan before calling at the office to borrow money?

30. John Elliott purchased a motor bike for $5.00 down and $5.00 a month for 30 months. If he paid cash, the bike would cost $125.00. Find the carrying charge.

In making purchases on the installment plan, keep the following in mind:

a. Read before you sign. Keep a copy of what you sign.

b. Ordinarily purchase only one item at a time on the installment plan.

c. The carrying charge is the interest.

ASSIGNMENT 32

LIFE INSURANCE

Life insurance is a money protection against loss of income due to loss of life. Most people buy life insurance with two purposes in mind:

1. To protect their families against the loss of income they would suffer if the husband were to die

2. To build up savings that can be used in an emergency

Life insurance is a protection so that when death occurs there is cash available to pay funeral expenses, and in the case of the death of the husband, to provide some family income. The person (usually the wife) who receives the insurance money is called the beneficiary. Most policies also are written so that a policyholder can borrow money from the insurance company for any emergency that may arise, using his policy as security.

When you buy life insurance you do not walk in an office and buy it as you would a pencil or a book. The fact that you can afford it does not mean you can get it. There are five steps in purchasing a life insurance policy:

a. Choosing an agent is the first step. The agent is the salesman that represents the insurance company. The agent assists people in selecting the right kind of insurance. You should choose your life insurance agent just as you select your doctor and dentist. He should be a person to whom you can talk and in whom you have full confidence.

b. Filling out the application. In filling out the application you must give information about your height, weight, past illnesses and present health.

c. Taking a medical examination. In some cases the person applying for the insurance may be asked to take a physical examination paid for by the insurance company. The premium (the amount the insurance costs) will be higher if the person's health is below average. If the person's health is too poor, the company will refuse to sell him insurance. If the person does a dangerous type of work, he can be refused insurance or sometimes he may be charged a higher premium.

d. Signing the application. Remember: Be careful, read before you sign any paper.

e. Receiving the policy.

Using the above information, answer the following questions:

1. Why do insurance companies charge extra for people who are overweight?

2. Years ago airline pilots could not get life insurance, but today they can. Can you explain why?

3. Life insurance companies now contribute money to doctors for study to cure heart disease. Why?

4. In the list of occupations below, select those which might cause a worker difficulty in getting insurance:

   teacher
   construction worker
   stunt flyer
   window washer
   typist
   librarian

5. Which one of the following in the family should have the most insurance? Why?

   father mother son daughter

6. Payments made for insurance are called ________________.

7. On the application for insurance, why will you find this question: "During the past five years have you had treatment from a doctor?"

8. Tell whether each statement below is true or false:

   a. Life insurance should be purchased in accordance with a person's needs.

   b. The choice of an insurance agent is not very important in purchasing an insurance policy.

   c. Life insurance can be a means of savings as well as protection.

   d. Every family should have the same kind of insurance.

There are many different types of insurance. The following are the most common:

a. Ordinary or straight life. This is the most common type of policy and costs less annually than any other kind of lifetime insurance. Protection is provided during the entire life of the policyholder. The low cost is possible because you pay for the insurance until you die.

b. Limited payment life insurance. On this policy you pay for a definite number of years. At the end of that time the policy is paid for. Many of these policies are written to be paid up at the age of 65 years. This means that after 65 you no longer make payments, but when you die the company pays the full insurance to the beneficiary. Limited payment life insurance premiums are higher than ordinary or straight life insurance premiums because, on an average, the premiums are paid for a fewer number of years.

c. Endowment life insurance. A person pays for a certain number of years, such as 10, 20, or 30 years. If the person dies during the stated time of his policy, the amount of the policy is paid to his beneficiary. If he does not die during the stated number of years the person receives the value of the policy and is no longer insured by it. The endowment policy is more investment than protection, because it is designed to help one save money. Since it involves both insurance and saving, the premium is higher than that of other types of insurance.

d. Term insurance. This type of insurance offers only temporary protection for a stated number of years. The premiums are low, since the risk is for a short period of time and the policy usually has no "cash value."

Straight life, limited payment life, and endowment policies have a certain amount of savings in them. After the lapse of a short time (one or two years), each of these policies has a cash or loan value. The cash or loan value of a policy depends upon the number of years the policy has been in force and the size of the premium.

The best way to explain the differences between the four types of policies is to look at a table of rates for all four policies.

YEARLY PREMIUM FOR $1,000 OF EACH TYPE OF INSURANCE

Age	Ordinary or Straight Life	20 Payment Life	20 Year Endowment	10 Year Term
15	$17.08	$28.67	$51.05	-
20	$19.02	$31.19	$51.44	$ 7.77
25	$21.78	$34.26	$51.70	$ 8.29
30	$25.09	$37.71	$52.15	$ 8.98
40	$33.57	$45.25	$54.91	$13.32
50	$48.08	$57.02	$62.13	$25.85

The table gives the amount you would have to pay each year for $1,000 of each type of insurance. The column headed "age" indicates the age at which you would buy the insurance. As you read down the table the age increases. Observe as you read down each column the amount of money increases. In other words, as you get older the amount you pay for insurance increases because risk increases with age. This is one reason why you should purchase insurance early in life. To show the differences in these types of insurance, study the following examples:

a. Mr. Wheat, age 20, takes out a $1,000 ordinary or straight life insurance policy. The yearly premium (from the table) is $19.02. This means that Mr. Wheat will have to pay $19.02 every year until he dies. When he dies, his wife (or whoever Mr. Wheat designates in the policy) will receive $1,000.

b. Mr. Johnson, age 30, buys a 20-payment life insurance policy for $1,000. From the table you find the yearly premium will be $37.71. In this case Mr. Johnson will pay $37.71 every year for 20 years. At the end of 20 years Mr. Johnson is finished paying for the policy, but his beneficiary does not get the $1,000 until he dies. Mr. Johnson is 50 years old when he finished paying for the policy (30 + 20 = 50), but the $1,000 is paid when he dies. This policy differs from the ordinary or straight life in that Mr. Johnson pays for a definite number of years (20) and then is finished paying.

c. Mrs. Allison, age 40, takes out a 20-year endowment policy for $1,000. The yearly premium from the table is $54.91. Mrs. Allison will pay $54.91 every year for 20 years. In this example Mrs. Allison will accumulate $1,000 in 20 years. If she dies during this 20 years, Mrs. Allison's beneficiary will receive $1,000. If she does not die during the 20 years, Mrs. Allison will get the $1,000 at the end of the 20 years. This is how an endowment policy differs from the first two policies (ordinary and 20-payment life). An endowment policy puts the emphasis on saving more than on protection. Its purpose is to accumulate a certain amount of money. Note that the premium is higher than on ordinary and 20-payment life policies. Discuss reasons.

d. Jack Turner, age 25, buys a 10-year term policy for $1,000. The yearly premium from the table is $8.29. For the next ten years Jack Turner will have to pay $8.29 each year for $1,000 of life insurance. If he dies during this 10-year period, his beneficiary will receive $1,000. When the 10 years are up (Jack will then be 35), the insurance ends. After the 10 years Jack has no insurance protection from this policy. Notice from the table that the rates for this type of insurance are lower than the other types of insurance since the insurance is for a short period of time and not a lifetime.

In each of the following problems, use the table on Page 78 to obtain the rates required:

9. Jim Wilson bought a $1,000 ordinary life insurance policy payable on death to his wife. Jim is 25 years old.

   a. What is the yearly premium?
   b. If Jim dies when he is 26, how much does his wife collect?
   c. How long will Jim have to pay on this policy?

10. Mrs. Maurer, age 25, took out a $1,000 20-payment life insurance policy.

   a. What is the yearly premium?
   b. How many years does Mrs. Maurer have to pay for the insurance?
   c. How old will Mrs. Maurer be when the insurance is "paid up"?
   d. Can Mrs. Maurer get the $1,000 before she dies?

11. Mr. Will bought a 20-year endowment policy for $1,000 with Mrs. Will as beneficiary. He is 20 years old.

    a. How much does he pay each year?
    b. How old will Mr. Will be when the policy is "paid up"?
    c. If Mr. Will dies at age 35, how much will Mrs. Will get?
    d. Does Mr. Will have to die for the $1,000 to be collected?

12. Mr. Jackson, age 50, takes out a $1,000 10-year term insurance policy with Mrs. Jackson as beneficiary.

    a. How much does he pay each year?
    b. If Mr. Jackson dies at age 57, how much money would Mrs. Jackson receive on this policy?
    c. If Mr. Jackson dies at age 64, how much would Mrs. Jackson receive on this policy?
    d. Does Mr. Jackson have any insurance from this policy after he is 61 years old?

13. Find the yearly premium on $1,000 insurance for each of the following:

a. Ordinary life	40 years old
b. 10-year term	20 years old
c. 20-year endowment	30 years old
d. 20-payment life	15 years old
e. Straight life	50 years old
f. 20-year endowment	25 years old

14. Mr. Kelly is 40 years old. How much less for him is an ordinary life policy than a 20-year endowment policy?

15. Helen Moser (age 25) decides to take out a 10-year term policy instead of a 20-payment life policy. How much does she save per year in premium payments?

16. Jimmy Jones is 15 years old. His father decides to take out a 20-year endowment policy on Jimmy rather than a straight life policy. How much more is the premium each year on the 20-year endowment policy than on the straight life policy?

In many cases people purchase more than $1,000 worth of insurance. The table is for $1,000 worth of insurance, but it can be used to find the yearly premium for any amount of insurance. If you want the yearly premium for $2,000, then you multiply the amount in the table by 2, for $3,000 multiply the rate by 3, and for $5,000 by 5, and so on. Study the following examples:

a. $2,000 - ordinary life, age 20
   $19.02 (from table)
   x 2 (number of $1,000)
   $38.04 for $2,000 insurance

b. $5,000 - 20-year endowment, age 50
   $62.13 (from table)
   x 5 (number of $1,000)
   $310.65 for $5,000 insurance

c. $8,000 - 10-year term
age 50

$25.85 (from table)
x 8 (number of $1,000)
$206.80 for $8,000 insurance

17. How many 1,000s are there in each of the following:

a. 3,000
b. 7,000
c. 15,000
d. 23,000
e. 2,000
f. 97,000

18. Mr. Shelby, who is 25 years old, decides to buy an ordinary life policy for $3,000. What is the yearly premium?

19. When he is 25 years old, Mr. May takes out a 20-payment life policy for $8,000. How much is his yearly premium?

20. Mr. Sun, a man 30 years old, takes out a 10-year term policy for $10,000. How much does he pay each year?

21. Mr. Bell, who is 40 years old, takes out a 20-year endowment policy for $5,000. Find his annual premium.

22. When he was 20 years old, Fred Hatfield took out a 20-year endowment policy for $4,000. How much did this insurance cost per year?

23. Find the premium for each of these policies:

a. $ 4,000, straight life, at age 25
b. $10,000, 20-year endowment, at age 30
c. $ 5,000, 20-payment life, at age 40

24. Find the annual premium to be paid on each $6,000 policy:

	Age	Kind of Policy		Age	Kind of Policy
a.	50	20-payment life	d.	25	20-year endowment
b.	15	straight life	e.	20	ordinary life
c.	40	10-year term	f.	30	20-payment life

When you purchase insurance you must compare the different kinds of policies and the cost of each. Example: When he was 25 years old, Mr. Rand conferred with an insurance agent on whether to take out a 20-payment life for $3,000 or an ordinary life policy for $3,000. Which one costs more, and how much more per year?

20-payment life - $3,000	Ordinary life - $3,000
$34.26 (from table, age 25)	$21.78 (from table, age 25)
x 3 (number of $1,000)	x 3 (number of $1,000)
$102.78	$65.34

$102.78
- 65.34
$ 37.44

20-payment life costs $37.44 more per year than ordinary life. What should be considered besides cost?

25. Mr. Sand, a man of 30, took out a 10-year term policy for $10,000. If he had taken out an ordinary life policy instead of the term policy, how much more would his annual premium have been?

26. Mr. Bell, who is 40 years old, decided to purchase $5,000 worth of insurance payable on his death to his wife.

    a. Find the cost of an ordinary life policy for Mr. Bell for one year.
    b. Find the cost of a 20-payment life policy for Mr. Bell for one year.
    c. Find the cost of a 20-year endowment policy for Mr. Bell for one year.
    d. Find the cost of a 10-year term policy for Mr. Bell for one year.
    e. Which policy is the cheapest? The most expensive?

Suppose that Mr. Bell died one year after he took out the ordinary life insurance policy in Part (a) of Exercise 26. You find in Part (a) of that problem that Mr. Bell paid $167.85 for the first year's premium. This question may come to your mind: "How can the insurance company pay Mr. Bell's wife $5,000 when Mr. Bell died if he paid only $167.85 on his policy?" The answer is that insurance is based on the idea of many people sharing the same kind of risk. There were thousands and thousands of other people who bought the same kind of insurance that Mr. Bell bought and most of them will live and pay for many years. In the United States alone in 1953, 121,000,000 people had life insurance policies. This is how the insurance company can pay Mrs. Bell $5,000 when Mr. Bell had paid only $167.85.

There are many other items in life insurance which have not been covered here. Some of these are dividends, cash value, surrender value, and annuities. Copy this address:

Institute of Life Insurance
488 Madison Avenue
New York 22, New York

Now, or at any time in the future, the Institute will be happy to send you booklets explaining all about insurance.

The following problems are for review of the work on insurance:

27. Complete the following statements:

    a. Payments made for insurance are called _________.
    b. Insurance is made possible because large numbers of people are willing to share the same kind of _________.
    c. Life insurance provides _________ in case the father or bread winner dies.
    d. If the father or wage earner does not die before the policy is paid for, then the insurance policy is a form of _________.
    e. The most widely used of all types of life insurance is the _________________ plan.
    f. In buying life insurance you must fill out an _________.

28. Circle T (for true) or F (for false) in each problem:

a. T F A health examination is always necessary to get an insurance policy.
b. T F It is important for the family wage earner to have adequate insurance.
c. T F The only value that insurance has is protection against loss of life.
d. T F An insurance agent gives advice about the kind and amount of insurance that fits each person's needs.
e. T F A straight life policy emphasizes savings more than other kinds of policies.
f. T F Insurance is made possible because large numbers of people are willing to share the same risk.
g. T F Life insurance can be a means of savings as well as a means of protection.
h. T F Straight life insurance is the most expensive lifetime protection.
i. T F Premiums vary with the age of the person at the time he takes out the policy.

29. Why does an ordinary life insurance policy taken out at age 20 cost less than one taken out at age 30?

30. Are the life insurance needs of two 30-year old men, each earning the same salary, necessarily the same?

31. What are the four chief types of life insurance?

32. As you get older the rates for insurance go _________.

33. The amount you pay each year for insurance is called the _________.

Death is always a threat to the financial security of the home. For this reason you should have some insurance protection. In purchasing insurance keep the following points in mind:

1. Select a reliable agent. When you buy a car you have all sorts of models to choose from--station wagons, convertibles, and sedans. Life insurance also comes in different forms. The agent helps select the kind and amount of insurance that the person needs and can afford.

2. Start early in life to purchase insurance. At age 20 the rates for insurance are much lower than at age 40. Pay for your insurance during the years when you are earning.

3. **Make changes in your insurance program as your income increases.**

4. Write to insurance companies and get their booklets on insurance.

5. Read before you sign.

ASSIGNMENT 33

REVIEW

1. $\begin{array}{r} 8504 \\ 2967 \\ 6790 \\ \underline{+\ 4865} \end{array}$

2. $\begin{array}{r} 9\frac{1}{9} \\ \underline{+\ 3\frac{2}{9}} \end{array}$

3. $\begin{array}{r} 12\frac{1}{3} \\ \underline{+\ 4\frac{3}{4}} \end{array}$

4. $\begin{array}{r} 15.017 \\ 27.268 \\ 4.596 \\ \underline{+\ 18.260} \end{array}$

5. $\begin{array}{r} 8657 \\ \underline{-\ 2945} \end{array}$

6. $\begin{array}{r} 23.75 \\ \underline{-\ 15.86} \end{array}$

7. $\begin{array}{r} 7\frac{5}{6} \\ \underline{-\ 2\frac{1}{6}} \end{array}$

8. $\begin{array}{r} 9\frac{1}{3} \\ \underline{-\ 3\frac{1}{2}} \end{array}$

9. $\begin{array}{r} 365 \\ \underline{\times\ 34} \end{array}$

10. $\begin{array}{r} 76.3 \\ \underline{\times\ 72} \end{array}$

11. $\begin{array}{r} 800 \\ \underline{\times\ 6.27} \end{array}$

12. $\begin{array}{r} 3.81 \\ \underline{\times\ 5.6} \end{array}$

13. $53/\overline{389}$

14. $5.3/\overline{15.75}$

15. $.5/\overline{8.750}$

16. $.37/\overline{8.586}$

17. $9.2/\overline{23}$

18. $3.14/\overline{27.946}$

19. The amount it costs to rent an automobile is dependent on three things: the type of car, the amount of time you keep the car, and the number of miles you drive it. The table gives typical rates charged in Chicago.

Type of Car	1-week Rental	Charge Per Mile
Nash Rambler Sedan	$35.00	8¢
Ford, Chevrolet, Plymouth	$50.00	10¢
Buick, Oldsmobile	$60.00	11¢
Thunderbird	$60.00	12¢
Cadillac	$75.00	14¢

Example: If you rented a Nash Rambler Sedan for 1 week and drove it 250 miles, how much would it cost?

$$\begin{array}{rl} 250 & \text{(number of miles driven)} \\ \underline{\times.08} & \text{(8¢ a mile)} \\ \$20.00 & \text{charge for driving 250 miles} \end{array}$$

$$\begin{array}{rl} \$35.00 & \text{(rental)} \\ \underline{+\ 20.00} & \text{(mileage)} \\ \$55.00 & \text{total cost} \end{array}$$

Use the table in each of these problems:

a. Mr. Simpson rented a Ford car for 1 week to distribute telephone books. He drove 375 miles. How much did he pay for the rental of the car?

b. When Mrs. Allen's parents came for a visit, Mrs. Allen rented a Buick car to show them around town. If she drove 320 miles and kept the car 1 week, how much did it cost?

c. When John Scott's vacation rolled around he heard of a good fishing spot 100 miles away from his home. He rented a Thunderbird for a week. If he drove a total of 225 miles, how much did the use of the car cost?

d. When an important official from Washington visited a small town, the officials rented a Cadillac for 1 week to drive him around town. During the week they drove 125 miles. Find the cost.

e. In each of the following find the cost of renting for 1 week:

Chevrolet	375 miles
Oldsmobile	450 miles
Plymouth	670 miles
Nash Rambler Sedan	245 miles

20. Through the center of the earth the distance is about 7,900 miles. If you could travel this distance in a car at 40 miles per hour, how many hours would it take to drive through the center of the earth?

21. Within the United States a person traveling by plane can take 40 pounds of luggage without extra cost. If a plane carried 75 people, how many pounds of luggage could it carry without extra charge?

22. In August, 1959, the Census Bureau reported that 86 of each 100 households had television sets. In 1950 there were TV sets in only 12 of every 100 households. Write these facts in the table below as fractions, decimals, and per cents:

Year	Fraction	Decimal	Per Cent
1950			
1959			

23. $\frac{3}{4} + \frac{3}{8}$

24. $7\frac{1}{3} - 3\frac{5}{6}$

25. $12\frac{7}{12} - 7\frac{3}{4}$

26. $\frac{3}{8} \times 24$

27. $2\frac{1}{4} \times 3\frac{1}{2}$

28. $\frac{5}{8} \times \frac{16}{25}$

29. $4\frac{1}{5} \div 3\frac{1}{2}$

30. $8\frac{3}{4} \div 5$

31 $\frac{1}{2} \div \frac{5}{8}$

32. $6 \div \frac{3}{7}$

33. $\frac{3}{7} \times 4\frac{2}{3}$

34. $8\frac{1}{5} - 3\frac{1}{2}$

35. Mrs. Beam roasted $4\frac{1}{2}$ pounds of beef. The family ate $2\frac{3}{4}$ pounds. How many pounds were left?

36. Hot dogs are on sale at 68¢ a pound. How much will $2\frac{1}{2}$ pounds of hot dogs cost?

37. Jack caught two fish on a recent fishing trip. One fish weighed $3\frac{1}{4}$ pounds and the other one weighed $2\frac{1}{2}$ pounds. Find the total weight of the fish.

38. In each problem below circle the mistake:

a. $\begin{array}{r} 236 \\ 487 \\ +\ 905 \\ \hline 1528 \end{array}$ b. $\begin{array}{r} 36{,}049 \\ -\ \ 5980 \\ \hline 31{,}069 \end{array}$ c. $\begin{array}{r} \$7.48 \\ \times\ \ 600 \\ \hline \$448.800 \end{array}$ d. $\begin{array}{r} 6R7 \\ 75\overline{)4507} \\ \underline{450} \\ 7 \end{array}$

39. Work each problem in Exercise 38 correctly.

40. The rockets being fired by the United States Government are growing larger every day. The table gives the name and height of each of some of the rockets to be fired in the future. To give you some idea of their size, the Statue of Liberty is 151 feet high.

Name	Height	Name	Height
Jupiter-C	69 feet	Vega	96 feet
Scout	70 feet	Saturn	200 feet
Atlas	95 feet	Nova	250 feet

a. How much taller is the Vega than the Scout?
b. How much taller is the Nova than the Jupiter-C?
c. How many of these are taller than the Statue of Liberty?
d. How much taller is the Nova than the Statue of Liberty?

41. In 1933 a trip across the United States by plane took $19\frac{3}{4}$ hours. The trip can now be made in about 5 hours. How much has this time been reduced?

42. Mrs. Armstrong owns a building in which there are 18 rented apartments. If each tenant pays $75 a month rent, how much does Mrs. Armstrong collect in a month?

43. Change each per cent to a decimal:

a. 75%
b. 17%
c. 8%
d. 5%
e. 99%
f. 1%
g. 60%
h. 25%
i. 70%

44. Find:

a. 20% of 160
b. 5% of $60
c. 72% of 48
d. 60% of $5
e. 37% of 150
f. 1% of $90

45. Before school opened in September, 1959, many Chicago groups staged campaigns urging students to go back to school. In the United States 40% of all high school students drop out before graduation.

a. In the fall of 1957 there were 8,956,000 students enrolled in high schools. How many will drop out before graduation?

b. In a certain year high school graduates earned on an average about $4,000 a year, while college graduates earned on an average about $6,000 a year. How much more were the average earnings of a college graduate than those of a high school graduate in that particular year?

46. Mr. West plans to save 8% of his salary. How much should he save in a year if his salary is $8,000?

47. Mr. Samuels gave 10% of his salary to his church. If his salary last year was $7,800, find the amount Mr. Samuels contributed to his church.

48. $$\begin{array}{r} \$106.03 \\ 18.20 \\ 941.86 \\ 63.59 \\ .99 \\ \underline{+\quad 8.00} \end{array}$$

49. $$\begin{array}{r} \$643.92 \\ \underline{-\ 462.73} \end{array}$$

50. $$\begin{array}{r} \$46.89 \\ \underline{\times\quad 9} \end{array}$$

51. $14\overline{)40.304}$

52. $.23\overline{)125.81}$

53. $.56\overline{)190.4}$

54. $.56\overline{).1618}$

55. $8\overline{).664}$

ASSIGNMENT 34

FINANCING AN AUTOMOBILE

Fifty years ago the automobile was just another gadget, but in its short lifetime it has made fantastic progress, as illustrated by the following data for the United States:

1. Ten million people earn their living in the automobile industry.

2. Three-fourths of all workers reach their jobs by privately-owned automobiles.

3. There are 63,000,000 motor vehicles in use. This means one automobile for every three persons.

In the not too far distant future you will probably be involved in buying, owning, and operating an automobile. This assignment is intended to help you, so that when that time arrives, you will have some idea of what ownership of an automobile involves.

Your first car purchase may be a used car. Listen to the following story:

Jim Klein saw an advertisement for just the car he was looking for. The price advertised was $350.00. Jim signed a blank contract to buy the car. When he got his finance papers the price of the car was marked as $795.00. Besides paying an additional $445.00 ($795-$350) for the car, Jim found the motor in such bad shape that he had to replace it shortly after he got the car.

Some members of the class may have stories similar to this about what has happened to people they know. When you purchase a used car, keep the following points in mind:

1. Reputation of the dealer is your most important consideration when buying a car. The smartest way to shop for a used car is to shop for reputation. The dealer with a good reputation is always your best bet for a used car that will give you satisfaction and service.

2. Never sign anything until you have read it carefully. Insist that the papers be made out before you sign them, and get the copy you are entitled to.

3. Purchase a car that fits your needs. Are you going to use the car for work or pleasure? How many people will ride regularly? What is the price, payments, and cost of operation? Remember, the bigger the car, generally, the more it costs to operate.

4. Check the car "on the lot" before test driving it. Look for the following: signs of accidents or careless handling, high mileage (worn foot pedals, broken seats), tires and wheels, brakes (pedal should not sink to the floor under pressure), how the engine starts. If the inside of a car has been well-cared-for, the owner has probably cared for the engine, too.

5. Drive the car before you buy it. Two-thirds of all complaints are from people who did not drive their cars before they bought them. If the dealer will not let you drive a car, do not buy it.

You will probably not find a car that will give you an "A" rating on all these things, but you want to keep your troubles to a minimum.

After you have found the car of your choice, the next problem is how to pay for it. Financing an automobile is a big problem. Automobiles are expensive. The best policy is to pay cash since the rates of interest on automobile financing are high. More automobiles are bought on the installment plan than any other item. Two-thirds of all purchases of new and used cars are bought on time. In a midwestern city in a recent year, 58% of all cars purchased on the installment plan were reclaimed. Purchasing a car is the same as purchasing any item on the installment plan. If you cannot afford it, do not buy it.

Loans for purchasing an automobile are made by banks, credit unions, and loan companies. There are also loan companies that deal exclusively with automobile financing. The usual way to repay an automobile loan is in monthly payments. Usually the bank or loan company gives less time to repay a loan on a used car than a new car. The table below is typical of loans on new and used cars:

NEW CARS

Amount of Loan	21 Monthly Payments	24 Monthly Payments
$ 500	$25.69	$22.71
$ 700	$35.96	$31.80
$ 900	$46.24	$40.88
$1000	$51.37	$45.52
$1500	$77.06	$68.13

USED CARS

Amount of Loan	15 Monthly Payments	18 Monthly Payments
$ 300	$21.67	$18.32
$ 400	$28.78	$24.32
$ 700	$50.12	$42.31
$ 900	$64.34	$54.30
$1000	$71.45	$60.29

1. Helen Rose borrowed $900 from a bank for 24 months to pay on a new car. From the table, what is the monthly payment?

2. Harold Rosen bought a used car. He borrowed $1000 from the bank for 15 months. What was his monthly payment?

3. The bank loaned Mr. Sampson $1500 for 24 months on the purchase of a new car. What was Mr. Sampson's monthly payment?

4. In the table below are examples of car prices taken from Chicago newspapers in August, 1959. In each case find the monthly payment, using the table above. They are all used cars.

Name of Car	Amount Borrowed	Number of Months	Monthly Payments
a. 1955 Ford Hardtop	$ 700	15	
b. 1956 Chevrolet Hardtop	$1000	18	
c. 1955 Oldsmobile	$ 700	18	
d. 1956 Buick	$ 900	15	
e. 1957 Plymouth	$ 900	18	
f. 1956 Pontiac	$1000	15	

5. Using the new and used car tables it is possible to find the amount of interest you pay on each loan. The table below is for interest on new car purchases. The first one has been worked for you. You complete the rest of the table.

INTEREST PAID ON NEW CAR LOANS

Amount of Loan	21 Monthly Payments	24 Monthly Payments
$ 500	$39.49	
$ 700		
$ 900		
$1000		
$1500		

$500 (21 monthly payments)

$25.69 (from table)
x21 (21 monthly payments)
2569
5138
539.49 (amount repaid)
-500.00 (amount borrowed)
$ 39.49 (interest)

6. Make a table of interests for used car loans similar to the table in Exercise 5.

7. From your table in Exercise 6:

   a. How much more interest do you pay for keeping $1000 for 18 months instead of 15 months?

   b. How much do you save by paying back $400 in 15 months rather than in 18 months?

8. The following was an advertisement for a loan company: "Now you can cut your car payments in one-half or more."

If you now owe:	your payments for 36 months will be:
$1,000	$36.93 a month
$2,000	$73.81 a month
$3,000	$110.94 a month

   a. For how many months would you have to pay on these loans? How many years is that?

   b. How much do you pay each month if you borrow $3,000? $2,000?

   c. To find the interest on borrowing $1,000:

$36.93
x36
22158
11079
$1329.48

$1329.48
-1000.00
$329.48

Find the interest on $2,000 and $3,000.

When you sign your contract read it over carefully so that you know:

a. To whom do you owe the money?
b. What amount you get back if you pay before it is due?
c. Are there penalty fees for late payment?

ASSIGNMENT 35

INSURING AND OPERATING AN AUTOMOBILE

One of the things you agree to when you buy a car on the installment plan is that you will keep an adequate insurance plan in effect. Never drive an automobile unless you have the proper insurance. If you have an accident but do not have adequate insurance, you can lose your car and your driver's license and find yourself in debt to the extent that it may take you years to repay what you owe.

Automobile insurance may be divided into two groups: that which will protect you against damage done to another car (or property or people); and that which will protect you against loss from damage to your own car. The first group (protection against damage done by your car to another car) is the most important type for any car owner to carry. It is called liability insurance. This is required by Illinois state law. There are two main parts to this insurance:

1. Bodily injury. If your car is the cause of an accident, this part of the insurance policy protects you against claims resulting from injuries to other people.

2. Property damage. If your car is the cause of an accident, this part of the policy protects you against claims resulting from damage done to other people's property (car, fence, home, etc.).

In the second group, there are two types of insurance to protect yourself:

1. Comprehensive. This policy protects your car against fire, theft, or other damage.

2. Collision. This insurance coverage provides payment to you for damage to your car in case of collision, whether you are at fault or not.

A summary of automobile insurance is given below:

Insurance That Protects

Other People	You
Liability	Comprehensive Collision
Bodily injury Property damage	

1. What is the first kind of insurance that every car owner should have?

2. What kind of insurance will cover damage to your own car?

3. What kind of insurance covers damage to some other person's car for which you are liable?

4. Some states require that you carry one of these forms of insurance. Which one do you think it is? What is the Illinois state law?

5. What kind of insurance protects you against your car being stolen?

Most car owners carry liability and comprehensive insurance. Most liability insurance policies use the expression "$10,000-$20,000." This means that up to $10,000 will be paid if one person is injured or killed and up to $20,000 if two or more are injured or killed.

6. Mr. Stone had a $10,000-$20,000 liability policy on his car. The policy cost $42.00 a year. He also had a $5,000 property damage policy that cost $20.00. What is the total cost of his insurance?

7. The policy rates in the table below are for $50,000-$100,000 bodily injury and $5,000 property damage. The rates are for one year on a car valued at $2,000.

Community	Liability		Comprehensive
	Bodily Injury	Property Damage	
Large city	$91	$26.50	$26.00
Small town	$48	$18.50	$16.00
Little village	$30	$11.50	$11.00

a. What does $50,000-$100,000 mean?

b. How much does it cost in a large city for bodily injury policy? In a little village?

c. How much does it cost for a comprehensive policy in a small town? Large city?

d. As the size of the community gets smaller, what about the rates for insurance? Can you explain this?

e. Find the total cost of liability and comprehensive insurance in each of the communities.

8. Collision insurance provides payment to you for damage to your car whether you are at fault or not. Collision insurance is expensive and if a car owner cannot afford all the different forms of insurance, then collision should be the one that is omitted. Most collision insurance policies have a clause stating that the owner of the car must pay the first $50.00 of the expense. This is called "$50.00 deductible." If the damage is $325.00, then the insurance company will pay $275.00 ($325 - $50 = $275). In each of the following find the amount the company will pay on a $50.00 deductible policy:

a. $650.00

b. $1,400.00

c. $875.00

d. $350.00

e. $150.00

f. $51.00

g. $50.00

h. $25.00

There are many reasons why automobile insurance rates are increasing year by year. The biggest reason is the increase in the number of accidents. The group of drivers who have caused this increase are the unmarried men between the ages of 16 and 25.

9. When Mr. Stone's 16-year old son started driving the family car, the cost of the liability insurance went up from $42.00 to $78.00, and property damage from $20.00 to $36.00. What was the total yearly increase in Mr. Stone's insurance when his son started to drive?

10. When Mr. Stone's next-door-neighbor, Mr. Jenkins' 16-year old daughter started driving the family car, the rates went up from $42.00 to $60.00 on liability and from $20.00 to $28.00 on property damage. Find the total increase in insurance per year.

11. Compare your answers in Exercises 9 and 10. Can you draw any conclusion about teen-age girl and boy drivers?

12. A year after Jim Landis graduated from high school he had saved enough to buy a car. When he called the insurance man to find out the cost of insurance he found the cost of liability insurance for a year was $108.00 (his father's was $42.00), and for property damage was $53.00 (compared to $20.00 for his father). How much more did Jim have to pay for insurance per year than his father paid?

These problems bring out a point that many of you will encounter in the next 10 years. Young people of ages 16 to 25 have to pay a great deal more for insurance than other age groups. The table below was drawn up by the Illinois Department of Insurance to show the cost of insurance for a year for various age groups. The table was computed for $10,000-$20,000 liability and $5,000 property damage. Use the table to answer Questions 13 to 19.

Community	Older Driver No One Under 25 Driving Car	Older Driver and Son Under 25 Who Uses Family Car	Unmarried man Under 25 Who Owns Own Car
Chicago	$82	$154	$270
Chicago Suburban	$58	$108	$191
Peoria, Illinois	$38	$ 70	$122
Springfield, Illinois	$34	$ 63	$110

13. How much is the insurance for Henry Smith, age 53, who lives in Chicago?

14. Michael McCarthy, age 20, unmarried, lives in a suburb of Chicago and owns his own car. How much insurance does he pay?

15. How much more is the insurance for Mr. Smith, age 53, who lives in Chicago than for Mr. Sands who has a teen-age son and lives in Springfield, Illinois?

16. Find the difference in insurance payments in each of the following:

    a. Charlie Wilson, age 19 and single, Chicago and
    Jim Smith, age 49, Springfield

    b. Helen Ward, 43, Peoria and Mary Logan, age 41, Chicago

17. As the community in which you live gets smaller, what happens to the insurance rates?

18. As you get older, what happens to the insurance rates?

19. Charlie Keller of Chicago, age 20 and single, saw an advertisement in the newspaper for a 1952 car for $195.00. How much more will Charlie pay for insurance than he will pay for the car? Does this make sense?

The only way that young people will be able to reduce the cost of their insurance is to reduce the number of accidents, and experts agree the only way to reduce accidents is to reduce speed. You remember some of these slogans:

"The life you save may be your own"

"Speed kills"

Most people do not realize how far a car travels from the time the driver decides to stop the car and the car comes to a full stop. The table gives these distances for different rates of speed:

Rate	Number of Feet To Stop the Car
20 miles per hour	40 feet
30 miles per hour	77 feet
40 miles per hour	128 feet
50 miles per hour	190 feet
60 miles per hour	263 feet
70 miles per hour	346 feet

20. How many feet will it take to stop a car traveling 40 miles per hour? 60 miles per hour?

21. A football field is 100 yards or 300 feet long. A car speeding 70 miles per hour would need a whole football field and how much more to stop?

22. On a baseball field the distance from home plate to second base is about 127 feet. If a car traveling 50 miles an hour started to stop at home plate, how far beyond second base would it go before it came to a stop?

23. Another way to show braking distance is to figure out how many parked cars you would pass while the car is coming to a stop. A car is about 17 feet long. At 30 miles an hour a car travels 77 feet to stop. To find the number of parked cars passed, divide 77 feet by 17. You would pass about $4\frac{1}{2}$ cars at that speed. (See example below.)

$$\begin{array}{r} \underline{4\ 9/17} \\ 17\overline{)\,77} \\ \underline{68} \\ 9 \end{array}$$

Find how many cars you would pass at 40 miles per hour, and 50 miles per hour.

24. How many cars would you pass traveling at 60 miles per hour? When you get home from school, count off that number of cars in front of your house. Is it a long distance?

25. One person is killed every 15 minutes in the United States in an automobile accident. How many is this in one hour? One day? One week?

26. The Korean War lasted three years, during which 33,629 Americans lost their lives. In 1957, 38,500 Americans were killed by automobile accidents. How many more people were killed in auto accidents in one year than in the Korean War?

In concluding this work on the automobile, keep these points in mind:

a. Drive carefully.
b. Never drive without adequate insurance.
c. Never drive without a proper driver's license.
d. If you purchase a car, buy from a reliable dealer.
e. Do not sign any papers unless they are completely filled in. Keep a copy of what you sign.

ASSIGNMENT 36

REVIEW

1.
$$\begin{array}{r} 97\\ 2{,}768\\ 125\\ 1{,}249\\ \underline{+20} \end{array}$$

2.
$$\begin{array}{r} \frac{2}{9}\\ \frac{2}{3}\\ \underline{+\frac{5}{6}} \end{array}$$

3.
$$\begin{array}{r} 8\frac{5}{6}\\ 7\frac{1}{3}\\ \underline{+9\frac{1}{2}} \end{array}$$

4.
$$\begin{array}{r} 38{,}142\\ \underline{-8{,}267} \end{array}$$

5.
$$8\frac{1}{2} \div 2\frac{1}{4}$$

6.
$$12 - 6\frac{1}{4}$$

7.
$$\begin{array}{r} \$85.27\\ \underline{-30.08} \end{array}$$

8.
$$\begin{array}{r} 7\ \frac{7}{8}\\ \underline{-3\ \frac{11}{12}} \end{array}$$

9.
$$\begin{array}{r} 8\ \frac{1}{2}\\ \underline{-3\ \frac{3}{4}} \end{array}$$

10.
$$\begin{array}{r} 297\\ \underline{x230} \end{array}$$

11.
$$\begin{array}{r} 6.12\\ \underline{x902} \end{array}$$

12.
$$65\overline{)40{,}040}$$

13.
$$78\overline{)29{,}172}$$

14.
$$57\overline{)26.049}$$

15.
$$\begin{array}{r} 8.5\\ \underline{-3.75} \end{array}$$

16.
$$\begin{array}{r} 5.19\\ -\ \underline{1.5} \end{array}$$

17.
$$20 \div \frac{1}{4}$$

18.
$$12 \times \frac{1}{3}$$

19.
$$2\ \frac{1}{4} \div \frac{1}{2}$$

20.
$$\begin{array}{r} 5\ \frac{1}{2}\\ \underline{+3.\ \frac{1}{3}} \end{array}$$

21.
$$\frac{2}{3} + \frac{3}{4}$$

22.
$$9\ \frac{1}{2} - 6\ \frac{2}{3}$$

23. Mr. Stevens put his car in a public garage while he was in the city for a period of 23 days. The rate was \$2.00 a day or \$35.00 for the whole 23 days. How much would he save by paying the \$35.00?

24. Jim Anderson rented a car for his 2-week vacation. The charges were \$35.00 a week and 10¢ for each mile he drove. If he drove 500 miles during the 2 weeks, how much did the car rental cost?

25. The area of the Atlantic Ocean is 31,830,800 square miles and the Pacific Ocean covers 63,801,700 square miles.

a. Which ocean is larger?
b. Find the difference in the areas of the oceans.
c. The Pacific is about how many times as large as the Atlantic?

26. A truck is carrying 39 rolls of roofing paper. If each roll weighs 75 pounds, what is the total weight of the roofing paper?

27. Mr. and Mrs. Hallisey bought some new furniture for $385.00. They paid $125.00 down and agreed to pay the remainder in equal monthly payments of $20.00 a month. How many months did the Halliseys have to pay on the furniture?

28. You can figure your railroad fare costs at about 3½¢ a mile. If the distance from Chicago to Detroit is about 272 miles, find the cost to travel to Detroit by train.

29. At the beginning of the summer a group of 9 boys found a local car dealer who would sponsor their junior league baseball team. The car dealer had to pay $8.50 for each suit and $5.40 a pair for shoes. How much did it cost the dealer to outfit the team?

30. Mr. Willie Spencer paid $18,000 for a house, including the lot. The lot was 1/6 of the entire cost. What was the cost of the lot? Of the house?

31. $\begin{array}{r} 457 \\ \underline{+62} \end{array}$

32. $\begin{array}{r} 3462 \\ \underline{-86} \end{array}$

33. $\begin{array}{r} 536 \\ \underline{\times 700} \end{array}$

34. $64\overline{)38642}$

35. $.03\overline{)27}$

36. $.62\overline{).1736}$

37. $\begin{array}{r} 19\frac{5}{6} \\ \underline{+8\frac{2}{3}} \end{array}$

38. $\begin{array}{r} 34\frac{3}{10} \\ \underline{-7\frac{3}{5}} \end{array}$

39. $5\frac{2}{5} \times 25$

40. $6\frac{1}{4} \div \frac{5}{9}$

41. $\frac{5}{8} \times 2\frac{1}{2}$

42. $\begin{array}{r} 6.40 \\ .52 \\ .65 \\ \underline{+8.03} \end{array}$

43. $\begin{array}{r} 4\frac{1}{2} \\ 3\frac{1}{8} \\ \underline{+6\frac{1}{4}} \end{array}$

44. $\frac{3}{4} - 2$

45. $7 - 2\frac{3}{4}$

46. Find the difference between:

a. 8.233 and 1.686
b. 7.9 and 2.61
c. 2.129 and 6

47. $\begin{array}{r} .07 \\ \underline{\times 8} \end{array}$

48. $\begin{array}{r} \$.03 \\ \underline{\times 3} \end{array}$

49. $32\overline{)\$1.28}$

50. $.5\overline{)125}$

51. Change each decimal to a per cent:

a. .12
b. .75
c. .30
d. .02
e. .06
f. .01
g. .99
h. .09

52. Find 7% of each of these numbers:

a. 79 b. 423 c. 8.5

53. A certain magazine costs 15¢ if you buy it on the newsstand. How much would you save if you took advantage of a special offer of 30 issues for $2.85?

54. Write a fraction whose numerator is 9 and whose denominator is 12. Reduce the fraction to its lowest terms.

55. Write a fraction whose denominator is 9 and whose numerator is 12. Change it to a mixed number.

56. If 3 picture post cards cost 10¢, how much would you pay for a dozen cards?

57. When Alaska became our 49th state, our coast line was increased very much. The coast line of Alaska is 26,000 miles long compared to 23,000 miles for the forty-eight states. How much longer is the coast line of Alaska than the coast line of the forty-eight states?

58. The animated cartoon has become one of the most popular types of movies. It takes about 18,000 drawings to make 500 feet of movie film. How many drawings are there in 2000 feet of film?

59. In 1956 there were about 42,000,000 TV sets in the United States compared to 4,000 in 1950. How many more sets were there in 1956 than in 1950?

60. During a recent year 8,133 ships passed through the Panama Canal. What was the average number of ships passing through in a week?

61. Mr. Walters stopped at a gasoline station and bought 12 gallons of gas at 32¢ a gallon and 2 quarts of oil at 45¢ a quart. How much did he spend? How much change should he receive from a ten-dollar bill?

62. An automobile mechanic uses a special gauge when testing spark plugs. The gauge varies from .025 of an inch to .040 of an inch. Find the difference between the smallest and largest measures.

63.
$$\begin{array}{r} \$\ 8.71 \\ 377.99 \\ 61.18 \\ 961.66 \\ \underline{+48.58} \end{array}$$

64.
$$\begin{array}{r} 5{,}930 \\ \underline{-3{,}985} \end{array}$$

65.
$$\begin{array}{r} 730 \\ \underline{\text{x}805} \end{array}$$

66. $79\overline{)3476}$

67. $26\overline{)1839}$

68. $44\overline{)2000}$

69. $86\overline{)5000}$

70.
$$\begin{array}{r} 8\,\frac{5}{6} \\ \underline{+6\,\frac{2}{3}} \end{array}$$

71.
$$\begin{array}{r} 6\,\frac{3}{8} \\ \underline{+4\,\frac{3}{4}} \end{array}$$

72. $5\,\frac{1}{2} \times \frac{4}{5}$

73. $5\,\frac{1}{3} \div 2\,\frac{2}{3}$

74.
$$\begin{array}{r} .811 \\ \underline{-.804} \end{array}$$

75.
$$\begin{array}{r} 37 \\ \underline{x.6} \end{array}$$

76.
$$\begin{array}{r} .568 \\ \underline{x10} \end{array}$$

77.
$$.6\overline{).54}$$

78. Find:

a. 25% of 62
b. 16% of 143
c. 69% of 84
d. 99% of 143

79. Fill in the missing words:

a. In the fraction $\frac{5}{6}$ the denominator is ______ and the numerator is __________.

b. A proper fraction is a fraction whose numerator is ______ than its denominator.

c. You can ___________ or ___________ the numerator and denominator of a fraction by the same number without changing its value.

80. Telephone poles are usually placed 132 feet apart on highways. How many poles will there be in one mile (1 mile = 5280 feet)?

81. In a recent golf tournament there were 147 people entered. After the first day 86 were eliminated because of poor scores. How many were left?

82. Salesmen who use their cars for business are allowed a certain amount of money because they use their own cars. If a salesman is allowed 8¢ a mile and he drives 275 miles in a week, find his car allotment for a week.

83. The world records for traveling one mile are as follows:

Jet - 3.5 seconds
Automobile - 9 seconds
Speed boat - 21 seconds
Railroad train - 32 seconds

a. Which way is the fastest? Slowest?

b. How much faster is a jet than a train?

c. How much faster is an automobile than a speed boat?

84. You have heard the expression the purchasing power of a dollar." It indicates how much your dollar will buy today, compared to previous years. Use 1939 as the year in which a dollar was worth a dollar (or 100 cents). This is what your dollar was worth in later years:

1939 - 100¢ (or $1.00)
1945 - 77¢
1951 - 56¢
1958 - 51¢

a. How much more would a dollar buy in 1939 than in 1945?
b. How much more would a dollar buy in 1945 than in 1951?
c. Was the $1.00 in 1939 worth twice as much as the dollar in 1958?

85.
$$\begin{array}{r} 24.88 \\ 315.62 \\ 46.75 \\ 230.64 \\ \underline{+309.49} \end{array}$$

86.
$$\begin{array}{r} 987,080 \\ \underline{-579,817} \end{array}$$

87.
$$\begin{array}{r} 504 \\ \underline{x900} \end{array}$$

88. $57\overline{)500}$

89. $43\overline{)26097}$

90. The Washington Monument in Washington, D.C. is 555 feet high. Tourists can go to the observation platform, which is 500 feet high. To get to the observation platform you can walk or take the elevator.

a. How much higher is the top of the monument than the observation platform?

b. If each step is about 7 inches high, how many steps would you have to walk up to get to the observation platform?

91. Mr. Lang bought a piano for $750.00. He traded in his old piano and received $140.00 credit for it. He will pay the balance in 8 monthly payments. Find the monthly payment.

92. The following figures give the approximate cost of operating electrical equipment:

Air conditioner - 4 1/2 cents per hour
Attic fan - 3/4 of a cent per hour
Heater - 4 cents per hour
Iron - 1 4/5 cents per hour
Television - 3/5 of a cent per hour

a. Which is the most expensive to operate? The least expensive?
b. What is the cost of operating a television set for 10 hours?
c. How much does it cost to iron for 5 hours?
d. What is the cost of operating an air conditioner for 12 hours?

93. A hotel man figures that on an average 2/3 of a pound of turkey will serve one guest. How many pounds are needed to serve 60 guests?

94. $59\overline{)1585}$

95. $1.7\overline{).034}$

96.
$$\begin{array}{r} 12\frac{5}{6} \\ \underline{+16\frac{5}{8}} \end{array}$$

97.
$$\begin{array}{r} 10 \\ \underline{-4\frac{3}{4}} \end{array}$$

98. $4\frac{1}{2} \times 2\frac{3}{4}$

99. $\frac{1}{4} \div 3\frac{1}{5}$

100.
$$\begin{array}{r} 106.60 \\ \underline{-49.69} \end{array}$$

101.
$$\begin{array}{r} .901 \\ \underline{x.4} \end{array}$$

102. $4\overline{)6.4}$

103. $.11\overline{).088}$

104. Change to decimals: a. 1% b. 98% c. 16%

105. Find 6% of 81.

106. Find 91% of 98.

107. Find 1% of 643.

108.
$$\begin{array}{r} 805,003 \\ \underline{-798,096} \end{array}$$

109. $1728\overline{)129,600}$

110. $365\overline{)21,535}$

BASIC MATHEMATICS II

UNIT V - UNITS OF MEASURE

ASSIGNMENT 37

Everything we buy and almost everything we use has been counted or measured in some way. The measures we use today are standard measures. This means that a unit of measure, such as an inch or an hour, is always the same. We use the unit of measure that is best suited to the thing we are measuring.

1. In each of the following, what unit would you use to measure:

a. temperature
b. your weight
c. your age
d. part of an hour
e. your height
f. milk
g. material for a dress
h. a class period
i. paint

This unit reviews the standard units of measure that you will encounter in everyday situations. The units of measure that you will study are:

units of length (inches, feet, yards, miles)
units of liquid measure (pints, quarts, gallons)
units of time (seconds, minutes, hours, days, weeks, months, years)
units of weight (ounces, pounds)

ASSIGNMENT 38

Linear measure is line measure. We use it to measure length of distance along a line. The units of length are the inch, foot, yard, and mile. All students should have a foot ruler in their notebooks to use for measuring and drawing straight lines. In the classroom your teacher has a yardstick to use for measuring and drawing lines. We will use the foot ruler and the yardstick to measure some of the objects in the classroom.

In your notebook make a copy of the table below. Estimate the size of each item and write your estimate in the proper column. Then measure each item with your ruler or yardstick.

1.

Item	Estimate	Measurement
Length of this page		
Length of your desk		
Height of your desk		
Width of room		
Length of room		
Width of this book		

2. Write on each line its length in inches.

a. ________ c. ______ e. ________________

b. ____________ d. __ f. __________

3. On your paper draw a line that you think is 3 inches long. Measure to see how close your estimate was to the exact length.

To measure short lengths we use the inch, the foot, and the yard.

12 inches = 1 foot
3 feet = 1 yard

Greater distances are measured in miles.

1 mile = 5,280 feet

You should memorize these units and be able to change from one unit to another. In changing larger units to smaller units you multiply; in changing smaller units to larger units you divide.

Multiply	Divide
To change feet to inches	To change inches to feet
To change yards to inches	To change inches to yards
To change yards to feet	To change feet to yards
To change miles to feet	To change feet to miles

Study the following examples before doing problem 4.

Change 13 feet to inches

13 feet
x12 number of inches in a foot
26
13
156 inches

Change 72 feet to yards

24 yards
3/ 72 (number of feet in yard)
6
12
12

4. Copy and fill in the blanks:

a. 12 feet = ___ yards
b. 72 inches = ___ feet
c. 7 feet = ___ inches
d. 15 yards = ___ feet
e. 26,400 feet = ___ miles
f. 4 miles = ___ feet
g. 144 inches = ___ yards
h. 24 feet = ___ yards
i. 11 yards = ___ feet
j. 7 yards = ___ inches

5. Copy and fill in the blanks. Parts (a) and (b) have been done for you.

a. 4 feet 9 inches = ___ inches

12
x4
48
+9
57 inches

b. 14 feet = ___ yards ___ feet

4 yards
3/ 14
12
2 feet

c. 5 feet 11 inches = ___ inches
d. 146 inches = ___ feet ___ inches
e. 68 inches = ___ feet ___ inches
f. 13 yards 2 feet = ___ feet
g. 19 feet = ___ yards ___ feet
h. 67 inches = ___ feet ___ inches

6. Which is larger?

   a. 3 feet or 34 inches
   b. 2 yards or 7 feet
   c. 8 inches or $\frac{1}{2}$ foot
   d. 17 feet or 6 yards

7. Harry had some boards that were 4 feet 9 inches long. How many inches long was each board?

8. Helen is 5 feet 2 inches tall. What is her height in inches?

9. What is your height? Change it to inches.

10. The lines on a football field are 10 yards apart. How many feet is that?

11. George thinks he will be 6 feet tall next year. He is now 5 feet 10 inches tall. He must grow ___ inches.

12. In Chicago there are 8 blocks in a mile. How many feet are there in a block in Chicago?

13. Find the number of feet in each block of a city in which there are:

    a. 6 blocks in a mile b. 10 blocks in a mile c. 7 blocks in a mile

14. A large plastic balloon soared to a height of 143,000 feet. How many miles is that?

15. Find the distance of your home from school in:

    a. miles b. blocks c. feet

16. If an airplane flies at:

    a. 5,000 feet Is this more or less than a mile?
    b. 10,000 feet Is this more or less than 2 miles?
    c. 17,000 feet Is this more or less than 3 miles?

17. A football field is 100 yards long. How many feet is this?

18. On a golf course Mr. Simmons drove a golf ball 212 yards. How many feet did he drive the ball?

19. The most common size of rug is 9 feet wide and 12 feet long. Change these measurements to yards.

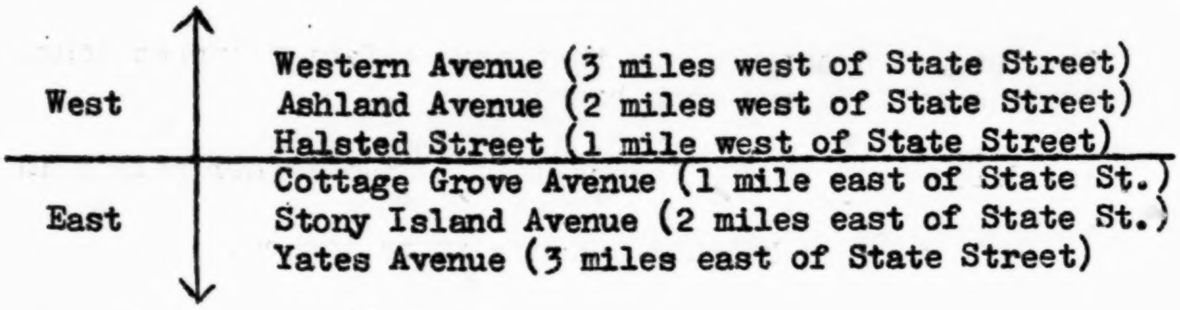
20. One of the most popular races in a track meet is the 220-yard dash. How many feet is this?

21. Howard Sloan wants to buy a new car which is 218 inches long. His garage is 16 feet 4 inches long. Will the car fit?

22. Which of these is the same as $\frac{1}{2}$ mile?

    a. 2140 feet b. 2640 feet c. 1610 feet

23. The City of Chicago is divided geographically so that the streets that are 1 mile, 2 miles and 3 miles east and west of State Street are main roads. The map below shows this situation.


West
Western Avenue (3 miles west of State Street)
Ashland Avenue (2 miles west of State Street)
Halsted Street (1 mile west of State Street)
East
Cottage Grove Avenue (1 mile east of State St.)
Stony Island Avenue (2 miles east of State St.)
Yates Avenue (3 miles east of State Street)

a. How many miles is it from State Street to Stony Island Avenue?
b. How many miles is it from State Street to Western Avenue?
c. How many miles is it from Ashland Avenue to Yates Avenue?
d. How many miles is it from Cottage Grove Avenue to Halsted Street?
e. How many feet is it from State Street to Halsted Street?
f. How many feet is it from Ashland Avenue to Stony Island Avenue?

ASSIGNMENT 39

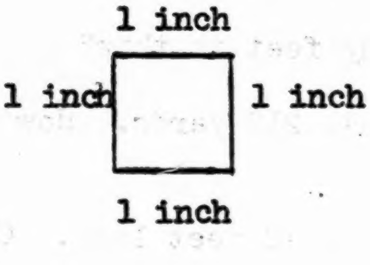
If you pick up a copy of today's newspaper you would find advertisements reading:

Beautiful Carpeting	$8.95 a square yard
Tile	$ .59 a square foot

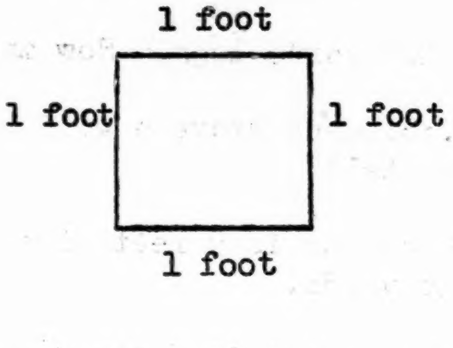
Purchasing these items introduces three new units of measure:

square inch   square foot   square yard

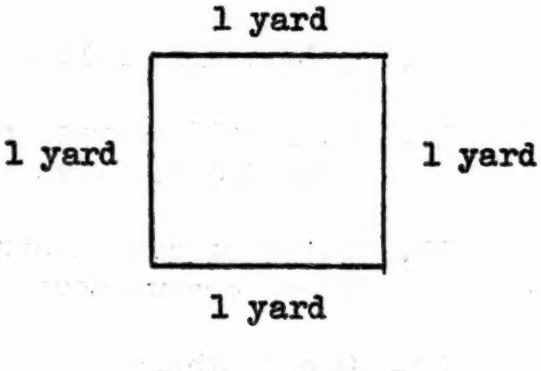
These units are called the units of square measure and are used to measure the amount of surface covered. The drawings below indicate the size and shape of each of these units.


1 inch
1 inch
1 inch
1 inch

1 square inch

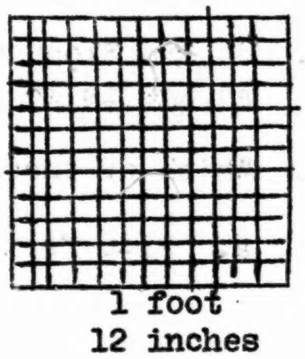

1 foot
1 foot
1 foot
1 foot

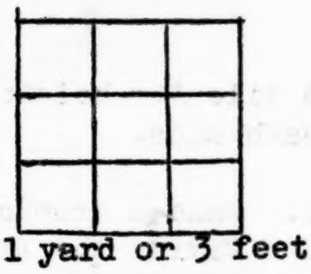
1 square foot


1 yard
1 yard
1 yard
1 yard

1 square yard

It is necessary sometimes to change from one unit to another. Using the figure at the right you see that when the square foot is divided into square inches that each of the little squares represents 1 square inch. In the square foot there are 12 rows of inches and 12 inches in each row so there are 12x12 square inches or 144 square inches in a square foot.


1 foot
12 inches



The square figure at the right represents 1 square yard. When you change the yards to feet there are 3 feet in each row and 3 rows so there are 3x3 or 9 square feet in a square yard.

Summarize these two facts:

144 square inches = 1 square foot
9 square feet = 1 square yard

Study the following examples:

3 square feet = ____square inches

144 (number of square inches in a square foot)
x 3 (square feet)
432 (square inches in 3 square feet)

27 square feet = ____square yards

$$\begin{array}{r} 3 \\ 9\overline{)\,27} \\ \underline{27} \end{array}$$
3 square yards
(number of square feet in a square yard)

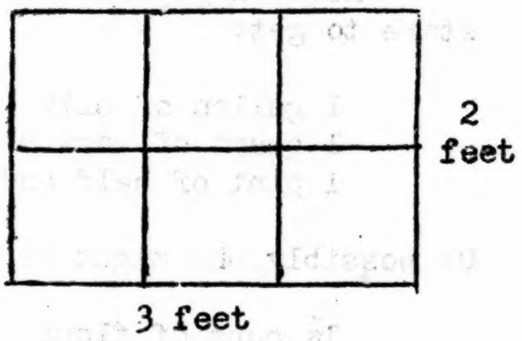
1. Fill in the missing number in each example:

   a. 5 square feet = _____square inches
   b. 14 square feet = _____square inches
   c. 36 square feet = _____square yards
   d. 81 square feet = _____square yards
   e. 432 square inches = _____square feet
   f. 864 square inches = _____square feet
   g. 11 square yards = _____square feet
   h. 17 square yards = _____square feet

2. Mr. Hudson wants to put a cement floor in his garage. He needs 24 square yards of cement. He must pay $5.75 a square yard. How much will the new floor cost?

3. Mr. Robinson purchased 8 square yards of linoleum at $4.00 per square yard. How much did the linoleum cost?

4. The drawing at the right represents a piece of glass Mr. Duncan bought to replace a broken window.



   a. If the dotted lines divide the figure into square feet, how many square feet are there in the pane of glass?

   b. If glass costs 28¢ a square foot, how much did Mr. Duncan pay for the glass?

5. Mr. Walters built a sandbox in his back yard for the children to play in. He constructed the sand box 5 feet long and 3 feet wide.

   a. Make a drawing of the sand box.
   b. Using dotted lines divide the box into square feet.
   c. How many square feet does the sand box cover?

6. A tile for holding hot dishes at the table measures 6 inches on each side.

   a. Make a drawing of the tile.
   b. Divide the figure into square inches.
   c. How many square inches does the tile cover?

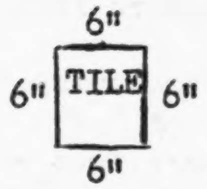
7. One of the most popular types of floor covering today is square tiles that are 6 inches on each side. Mr. Gleason decided to tile his small back porch pictured below.

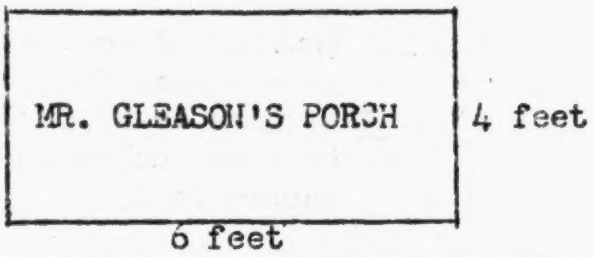
   a. If the tiles are 6" wide how many tiles will he need in each row (draw dotted lines)?

   b. How many rows will there be?

   c. How many tiles will he need altogether?

   d. If each tile costs 13¢ how much will all the tile (each paid for separately) cost?



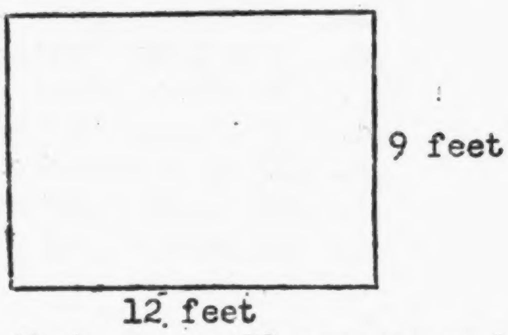


8. The most common size of rug sold is 9 feet by 12 feet (drawing below).

   a. Using dotted lines divide the figure into square yards.

   b. How many square yards are there in the rug?

   c. If the rug costs $8.95 a square yard, find the cost of the 9x12 rug.



9. In Mr. Jacobs' living room he has a rug that covers 30 square yards. How much did the rug cost if Mr. Jacobs paid $6.50 a square yard?

10. How many square feet in 4 square yards?

ASSIGNMENT 40

When you get home from school today your mother may send you to the store to get:

1 gallon of milk
1 quart of root beer
1 pint of half-and-half

Or possibly she might be baking and using such measures as the following:

1½ cups of flour
1 tablespoon of sugar
1 teaspoon of baking powder

The units of measure used in the above examples are common units which are used in the home every day. The table on the following page gives the relationship between these units.

3 teaspoons = 1 tablespoon 2 pints = 1 quart 4 quarts = 1 gallon

To change from one unit to another use the following:

Multiply	**Divide**
To change tablespoons to teaspoons	**To change teaspoons to tablespoons**
To change quarts to pints	**To change pints to quarts**
To change gallons to quarts	**To change quarts to gallons**

Study the examples carefully.

6 teaspoons = ____ tablespoons   6 quarts = ____ pints

$$\begin{array}{r} 2 \\ 3\overline{)6} \\ \underline{6} \end{array}$$

(number of teaspoons in a tablespoon)

$$\begin{array}{r} 6 \\ \underline{\times 2} \\ 12 \end{array}$$

(number of pints in a quart)

1. Copy and fill in the blanks:

a. 6 tablespoons = ____teaspoons
b. 12 teaspoons = ____tablespoons
c. 16 pints = ____quarts
d. 10 gallons = ____quarts
e. 20 quarts = ____gallons
f. 8 quarts = ____pints
g. 4 tablespoons = ____teaspoons
h. 27 teaspoons = ____tablespoons
i. 5 quarts = ____pints
j. 16 quarts = ____gallons

2. Mr. Infurger, a milkman, delivers 300 quarts of milk a day. How many gallons is that?

3. If a quart of ice cream serves 6 persons, how many can be served with 3 gallons of ice cream?

4. A farmer had 180 sugar maple trees on his farm. If he obtains 15 gallons of sap per tree, how much does he get from all of the trees? This is equal to how many quarts?

5. It takes 40 gallons of sap to make 1 gallon of maple syrup. How many gallons of sap are needed to make 5 gallons of maple syrup?

6. A large milk tank on a truck holds 2,000 gallons of milk. This is how many quarts?

ASSIGNMENT 41

Did you ever stop to think how many times a day you look at a clock or watch? When you get up in the morning, when you leave for school, when you arrive at school, beginning and ending of each class period, mealtime, bedtime, are examples of the different times during the day that you check the time. To measure short periods of time we

use the second, the minute, and the hour. The relationship between these units is given in the table of time measures.

60 seconds = 1 minute 60 minutes = 1 hour 24 hours = 1 day

Study the following examples that show how to change from one unit to another.

3 minutes = ____seconds

$$\begin{array}{rl} 60 & \text{(number of seconds in a minute)} \\ \underline{\times 3} & \\ 180 & \text{(seconds)} \end{array}$$

180 minutes = ____hours

$$\begin{array}{r} 3 \text{ hours} \\ 60\overline{)180} \\ \underline{180} \end{array}$$

(number of minutes in an hour)

3 days = ____hours

$$\begin{array}{rl} 24 & \text{(hours in a day)} \\ \underline{\times 3} & \\ 72 & \text{(hours)} \end{array}$$

Copy and fill in the blanks:

1. 4 minutes = ____seconds
2. 5 hours = ____minutes
3. 72 hours = ____days
4. 180 seconds = ____minutes
5. 3 hours = ____minutes
6. 6 minutes = ____seconds
7. 3 days = ____hours
8. 240 seconds = ____minutes
9. 144 hours = ____days
10. 2 days = ____hours

Sometimes it is necessary to change part of an hour into minutes or minutes into part of an hour. Study the following examples:

$\frac{1}{2}$ hour = ____minutes

$\frac{1}{2}$ of 60 (number of minutes in an hour)

$$\frac{1}{\cancel{2}_1} \times \frac{\overset{30}{\cancel{60}}}{1} = \frac{30}{1} = 30 \text{ minutes}$$

20 minutes = ____hour

20 minutes is $\frac{20}{60}$ of an hour

$$\frac{20}{60} = \frac{1}{3} \text{ of an hour}$$

Copy and fill in the blanks:

11. 1/4 hour = ____minutes
12. 30 minutes = ____hour

13. 3/4 hour = ____minutes
14. 15 minutes = ____hour
15. 1/3 hour = ____minutes
16. 45 minutes = ____hour

Ability to read time properly is an absolute necessity. Time between midnight and noon is A.M. and between noon and midnight is P.M. In reading time, you read the hour first, then the number of minutes beyond that hour. Study the following examples:

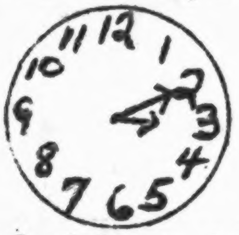
8:23 A.M. is read eight twenty-three or twenty-three minutes after eight. It is in the morning.
11:07 P.M. is read eleven seven or seven minutes after eleven. It is in the evening.
6:45 A.M. is read six forty-five or forty-five minutes after six or fifteen minutes to seven. It is in the morning.
2:35 P.M. is read two thirty-five or thirty-five minutes after two or twenty-five minutes to three. It is in the afternoon.

Read each of the following two ways and tell whether it is morning, afternoon, or evening:

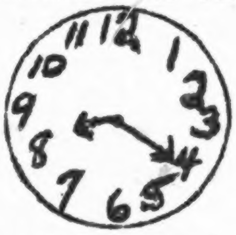
17. 8:15 A.M.
18. 10:22 P.M.
19. 4:35 P.M.
20. 1:10 A.M.
21. 7:18 P.M.
22. 10:55 A.M.
23. 3:09 P.M.
24. 5:29 A.M.
25. 6:45 P.M.
26. 9:48 P.M.
27. 3:37 A.M.
28. 1:40 A.M.
29. 8:50 P.M.
30. 3:37 A.M.

Write in two ways the time indicated on each clockface.

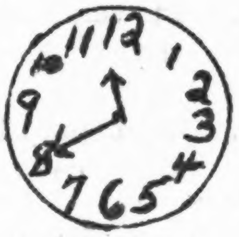
31.



32.



33.



Draw clockfaces to indicate the following times:

34. 5:15 35. 9:25 36. 10:35 37. 2:55

38. Write as numbers:

a. four o'clock
b. six ten
c. 5 minutes past 4
d. nine thirty
e. half past eight
f. three fifteen
g. two forty
h. 10 minutes to 7
i. five thirty-five

39. Fill in the blanks:

a. 8:20 means ____minutes past ___o'clock
b. 10:02 means ____minutes past ___o'clock
c. 3:45 means ____minutes past ___o'clock
d. 9:58 means ____minutes past ___o'clock

40. How many minutes past 4 is it when the minute hand points to 9?

41. Change 5 hours and 20 minutes to minutes.

42. Joe left for school at 8:45 A.M. He returned home at 4:15 P.M. How long was he gone?

43. If 1¢ was put in a parking meter every 12 minutes from 9 A.M. to 4 P.M., how much money was collected?

44. The telephone rang for 30 seconds. What part of a minute is that?

45. School starts at 8:30 A.M. Lunch is 3½ hours later. What time is lunch?

46. It took 2 minutes and 15 seconds for all the students to leave the building during a fire drill. How many seconds did it take?

47. If a plane lands or takes off every 30 seconds at an airport, how many planes load or take off in one minute? In one hour?

48. A train was due at 9:30 A.M. and arrived 35 minutes late. What time did the train arrive?

49. If a plane leaves Chicago at 4:25 P.M. and arrives in Los Angeles at 9:40 P.M., Chicago time, how many hours did it take to make the flight?

50. If a train leaves Chicago at 1:15 P.M. and arrives at Terre Haute, Indiana, at 4:30 P.M., how long did it take to make the trip?

51. A doctor counts your pulse for 15 seconds. What does he multiply by to get the pulse for a minute?

52. It takes an ocean liner 72 hours to make a trip. How many days is this?

53. Most people walk at an average rate of about 3 miles per hour. At this rate show how far a person would walk in 4 hours.

The table at the right was posted on a mail box. It indicates the times that the post office truck will pick up mail at that particular box.

MAIL PICK UP	
A.M.	P.M.
5:45	1:25
9:10	3:50
11:00	7:20
	9:25

54. What does A.M. mean?

55. What does P.M. mean?

56. How many times is the mail picked up in the morning?

57. How many times is the mail picked up in the afternoon and evening?

58. If a letter was put in the mail box at the time indicated what time would it be picked up?

a. 9:00 A.M. c. 1:30 P.M. e. 3:55 P.M. g. 10:30 P.M.
b. 7:25 P.M. d. 11:30 A.M. f. 10:00 A.M. h. 6:00 A.M.

All the problems in this assignment have dealt with the smaller units of time: seconds, minutes, hours, days. To finish this assignment on the units of time we will review now the larger units of time: weeks, months, and years. Study the table below carefully.

7 days = 1 week
52 weeks = 1 year
12 months = 1 year
365 days = 1 year

MULTIPLY	DIVIDE
To change weeks to days	To change days to weeks
To change years to weeks	To change weeks to years
To change years to months	To change months to years
To change years to days	To change days to years

Study the following examples before working the problems that follow.

3 weeks = ____days	104 weeks = ___years	5 years = ___months
7 (number of days in one week)	$\begin{array}{r} \underline{2} \\ 52\overline{)104} \\ \underline{104} \end{array}$ (number of weeks in a year)	12 (number of months in a year)
$\underline{x3}$ 21 days		$\underline{x5}$ 60 months

59. Fill in the blanks:

a. 42 days = ____weeks
b. 3 years = ___weeks
c. 48 months = __years
d. 4 years = ___days
e. 16 weeks = ___days
f. 28 days = ___weeks
g. 208 weeks = __years
h. 730 days = __years
i. 7 years = __months

You should know how to spell the name of each month correctly and also know the number of days in each month. The table below gives the name and number of days in each month. Learn them.

January	31	April	30	July	31	October	31
February	28	May	31	August	31	November	30
March	31	June	30	September	30	December	31

60. Using the above information:

a. Which months have 30 days?
b. Which months have 31 days?
c. How many days more than 4 weeks are there in the month of January?
d. What is the total number of days in the months of November, December, and January?

61. Do you remember the poem that tells the number of days in each month?

62. Part of the calendar for 1960 is shown below:

SEPTEMBER

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

OCTOBER

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

NOVEMBER

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

DECEMBER

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Using the months above, answer the following questions about 1960:

a. In what months are there five Fridays?
b. In what month are there five Sundays?
c. What month starts on Thursday and ends on Saturday?
d. What day of the week do each of the following holidays occur?
    Labor Day
    Veterans Day
    Christmas Day

63. Using the present month, what dates of this month would you do the following:

a. Work every Monday evening
b. Shop every Thursday
c. Play baseball every Saturday
d. Go to church every Sunday

64. Every four years there are 29 days in February. When this happens it is called a leap year. A leap year can be divided evenly by 4 (except if the year ends in two zeros, then it must be divisible by 400). At the right you see that 1952 was a leap year (no remainder) and that 1954 was not a leap year (there is a remainder). In each of the following figure out (by dividing by 4) which years have been or will be leap years.

$$\begin{array}{r} 488 \\ 4\overline{)1952} \\ \underline{16} \\ 35 \\ \underline{32} \\ 32 \\ \underline{32} \end{array} \qquad \begin{array}{r} 488 \\ 4\overline{)1954} \\ \underline{16} \\ 35 \\ \underline{32} \\ 34 \\ \underline{32} \\ 2 \end{array}$$

a. 1956   c. 1958   e. 2000   g. 1900
b. 1492   d. 1812   f. 1961   h. 1865

65. If a person is born on February 29, how often does he have a birthday?

66. There is a short way to write any date. The name of the month is replaced by a number. Study the following examples:

May 13, 1957 5/13/57 May is the 5th month of the year.

month day year

August 27, 1960 8/27/60 August is the 8th month of the year.

Change the following dates to the short form:

a. December 25, 1960
b. February 16, 1954
c. July 8, 1965
d. November 30, 1901
e. August 6, 1912
f. January 13, 1999

ASSIGNMENT 42

The last units of measure we will study are the units of weight.

16 ounces = 1 pound
2000 pounds = 1 ton

Study the examples.

6 pounds = ____ ounces

16 (number of ounces in 1 pound)
x 6
96 ounces

6,000 pounds = ______ tons

$$\begin{array}{r} 3 \\ 2{,}000\overline{)\,6{,}000} \\ \underline{6\,000} \end{array}$$

(number of pounds in a ton)

Copy and fill in the blanks.

1. 240 ounces = _____ pounds.
2. 3 tons = _____ pounds.
3. 8,000 pounds = _____ tons.
4. 4 pounds = _____ ounces.
5. A cake of chocolate weighs 8 ounces. If there are 4 squares in the cake, how much does each square weigh?
6. A can of fruit weighs $1\frac{3}{4}$ pounds. How many ounces is this?
7. Sign in an elevator reads: "Capacity 3,300 pounds." How many adults of average weight (150 lbs.) can this elevator carry?
8. A power shovel can lift 1 ton 200 pounds at one time. How many pounds is that?

9. How many ounces in ½ pound of butter?

10. If a pound of coffee costs $1.10, how much would ½ pound cost?

11. A box of candy is marked 1 pound 5 ounces. How many ounces is that?

12. Mrs. Levin bought 2 packages of candy, each weighing 10 ounces. The candy weighed ___ pounds ___ ounces.

13. The weight of an item does not necessarily indicate the size. Which makes a bigger package, 1 pound of sugar or 12 ounces of potato chips?

14. You have often seen this sign on a bridge: "Load Limit 5 Tons." Which of the following trucks can use this bridge:

    a. Truck load of steel - weight 8,000 pounds
    b. Truck load of wood - weight 11,000 pounds
    c. Truck load of dirt - weight 12,000 pounds
    d. Does it matter what is in the truck?

15. Which is heavier?

    a. ½ pound or 9 ounces
    b. 29 ounces or 3 pounds
    c. ½ pound or 5 ounces
    d. 17 ounces or 1 pound

ASSIGNMENT 43

The present group of high school students will have to use and work with more large numbers than any previous generation of students. This is the age of jets, atomic power, and large governmental budgets. The words "million" and "billion" are used today as frequently as "thousands" were used just a few years ago. This assignment will give you some idea of the size of millions and billions and give examples where they are used.

1. Suppose you could count $1 bills at the rate of 1 per second. In 5 seconds you could count $5 and in 43 seconds you could count $43.

    a. How many dollars could you count in a minute?
    b. How many dollars could you count in an hour?
    c. Most workers work 8 hours a day. In an 8-hour day how many could you count?
    d. If you worked a 5-day week how many dollars could you count in 5 days?
    e. How many dollars could you count in 7 weeks (5 days a week)?

You can see from these exercises that to count 1 million dollars at the rate of $1 per second for 8 hours a day, 5 days a week, would take almost 7 weeks. Suppose after you finished counting this million dollars you decided to put the money in one large stack. One million dollar bills would make a stack 280 feet high or the height of a 25-story building.

2. Perhaps you have a wrist watch you could listen to for a minute or two. If you listen for 1 minute the watch will tick 60 times (1 minute = 60 seconds).

   a. How many seconds in an hour?
   b. How many seconds in a day?
   c. How many seconds in 12 days?

   You would have to sit and listen (uninterrupted) for almost 12 days to hear 1 million seconds.

3. Suppose Christopher Columbus had started working in 1492 for $2,000 a year. Would he have earned a million dollars by 1959?

4. If Captain John Smith went to work in 1608 for $3,000 a year, would he have earned a million dollars by 1959?

5. The average income of workers in 1958 was $4,800 a year. If Mr. Jackson earned this amount for 65 years, would he earn a million dollars?

6. If you are 17 years old now and you went to work today for $4,800 a year, how much would you earn in:

   a. 40 years   b. 65 years   c. 209 years

   d. From part "c" you see it would take you almost 209 years to earn 1 million dollars. If you had started at the age of 17, how old would you be when you had earned your million dollars?

Previously in this assignment you figured out that to count 1 million dollars (at $1 a second, 8 hours a day, 5 days a week) would take almost 7 weeks. In the same way it would take almost 7 weeks for you to count 1 million cars. When you finish counting these cars, if you lined them up bumper to bumper, the line would reach from New York to San Francisco.

The size of a million becomes almost nothing compared to a billion. A billion is the same as one thousand millions. To count to a billion would take 1,000 times as long as counting to a million. Let's figure it out:

7 weeks to count to a million x 1000 = 7,000 weeks to count to a billion

(number of weeks in a year)

$$\begin{array}{r} 134 \text{ R } 32 \\ 52 \overline{)\,7000} \\ \underline{52} \\ 180 \\ \underline{156} \\ 240 \\ \underline{208} \\ 32 \end{array}$$

(number of weeks to count to a billion)

Counting at the rate of $1 a second, 8 hours a day, 5 days a week, 52 weeks a year, it would take you over 134 years to count a billion dollars.

7. If you started counting now, how old would you be when you had counted to a billion (at the rate given previously)?

8. To be elected a senator in the U. S. Congress, you must be 30 years of age. Suppose a man was elected to the Senate at age 30 and the first day in Congress he started to count one of the many billions of dollars Congress votes each year. How old would the senator be when he finished?

9. If you took all the vehicles (cars, buses, trucks) in the United States and put them on one highway they would fill eight lanes completely around the world. If there are 6,163,000 vehicles in each lane, how many vehicles are there in the United States?

10. Statistics show that the four-door sedan is the most popular car in America. Passenger car sales in a recent year were as follows:

Four-door sedans	2,500,000	Station wagons	300,000
Two-door sedans	1,400,000	Convertibles	100,000
Hardtops	900,000		

a. How many more four-door sedans were sold than two-door sedans?
b. How many more hardtops were sold than station wagons?
c. How many more two-door sedans were sold than convertibles?

11. Remember it took 12 days (uninterrupted) to hear a watch tick off a million seconds. You figure out how long it will take to hear the watch tick off a billion seconds.

12 days (to hear a million seconds)
x 1000 (number of millions in a billion)
(number of days to hear a billion seconds)

(number of days in a year) 365/‾‾‾‾‾‾‾‾

If you started listening now how old would you be when you would hear the billionth second?

Stacking a billion dollars (in $1 bills) in a single pile would make a pile 50 miles high. You have probably seen the Board of Trade building or the Prudential building in downtown Chicago. It would take 466 buildings such as one of these to make a stack the height of a billion dollars.

We are living in an era of fantastic progress in air travel. We have come into the jet age. A little over 50 years ago Orville and Wilbur Wright produced the first successful airplane flight, a distance of 120 feet in 12 seconds. Today's jet plane is about 124 feet long, and has a wing spread (wing tip to wing tip) of 135 feet. The cruising speed of the jet is about 600 miles per hour. It took Columbus 70 days to cross the Atlantic, and Lindbergh 33½ hours. A jet can cross in less than 7 hours. A jet plane costs about $6,000,000. In a year a jet plane will be able to carry as many passengers across the Atlantic as the liner United States (which cost $70,000,000). One airline says it will carry 20,200 passengers from coast to coast in a month, compared to 6,000 passengers who are carried by train. Jet planes travel so fast that a new word has been coined to indicate their speed. If a plane flies as fast as sound travels (750 miles per hour) it is said to be flying at Mach 1 (pronounced "mock"). If it flies faster than twice the speed of sound (1500 miles per hour) we say it is flying at Mach 2.

12. How much longer is the wing spread of a jet plane than the total flight of the first plane?

13. The first plane traveled 120 feet in 12 seconds or about 7 miles per hour. How much faster does a jet plane travel than the first plane traveled?

14. How much faster does a jet plane cross the Atlantic than the time it took Lindbergh?

15. The new economy cars for 1960 will cost about $2,000. For the price of a jet plane how many of these cars could you buy?

16. About how many jet planes could you buy for the money spent to build the liner United States?

17. How many more passengers per month can one airline carry than a train?

18. In each case tell whether the jet plane is flying at Mach 1 or Mach 2.

a. 755 mph   b. 900 mph   c. 1570 mph   d. 1599 mph

ASSIGNMENT 44

REVIEW

1. $1.95
2.50
.98
1.25
.75
+ 5.04

2. 45,278
+ 53,578

3. 3008
- 2460

4. 86,418
- 50,376

5. 148
x 79

6. 261
x 307

7. 348
x 500

8. 54/ 1429

9. 79/ 1599

10. 17/5069

11. A store sold 63 suits at $29.95 and 42 suits at $39.95. What was the total of these sales?

12. Mr. Collier's monthly salary is $400. How much does he receive in a year?

13. On the family vacation, the Johnsons drove 720 miles. Mr. Johnson said he bought 60 gallons of gas. Find the number of miles per gallon he used.

14. Helen bought 2 pounds of candy. If she put $\frac{1}{4}$ pound in each bag, how many bags of candy will there be?

15. The first United States census in 1790 gave the population (17 states then) as 3,929,214. In 1956 the population was 168,091,000. What was the increase in population?

16. In a recent year the busiest airport in the United States was Midway Airport in Chicago with 380,339 landings and take-offs. La Guardia Field in New York ranked third in the United States with 272,719 landings and take-offs. Find the total and the difference of these numbers.

17. The first atomic-powered submarine, the Nautilus, cruised for 5,400 hours on its first voyage. How many days is this?

18. During the 10-year period from 1946 to 1956, the number of air conditioners in use rose from 100,000 to 3,600,000. How many more air conditioners were in use in 1956 than in 1946?

19. A camera selling regularly for $65 is on sale at 25% off. What is the sale price?

20. A man bought a house for $18,000. He paid 30% down and the rest in monthly payments. How much was his down payment and how much was left to pay in monthly payments?

21. $\begin{array}{r} \frac{1}{4} \\ +\ \frac{3}{16} \\ \hline \end{array}$

22. $\begin{array}{r} 2\frac{1}{6} \\ +\ 4\frac{7}{8} \\ \hline \end{array}$

23. $\begin{array}{r} \frac{5}{6} \\ -\ \frac{1}{9} \\ \hline \end{array}$

24. $\begin{array}{r} 4\frac{1}{2} \\ -\ 1\frac{1}{6} \\ \hline \end{array}$

25. $\begin{array}{r} 6 \\ -\ 1\frac{7}{12} \\ \hline \end{array}$

26. $\frac{3}{4}$ of 24

27. $2\frac{1}{2} \times 3\frac{1}{2}$

28. $3\frac{1}{4} \div 1\frac{3}{4}$

29. $8 \div \frac{1}{2}$

30. At a party there were $5\frac{1}{2}$ dozen cookies. $2\frac{3}{4}$ dozen were eaten. How many dozen were left?

31. A recipe calls for $2\frac{1}{2}$ cups of flour. If you made only $\frac{1}{2}$ of the recipe, how many cups would you use?

32. Jim had a board 7 feet long. The wood at each end was rotten so Jim cut off $\frac{3}{4}$ of a foot from each end. How many feet of board were left?

33. Mrs. Rosen bought a dress. She gave the clerk a $10.00 bill. If she received $2.98 change, how much was the dress?

34. Joe Engle has saved $8.95. The football outfit he wants to buy costs $14.85. How much more does he need?

35. During the Christmas season a store increased the number of employees by 50%. If the regular staff is 24 employees, how many will be working during the Christmas season?

36. A department store spent 7% of the amount of their sales for advertising. If their sales for a year were $42,960, how much did they spend on advertising?

37. In 1956 there were 143 million radios and 42.2 million TV sets in use in the United States.

    a. How many more radios than TV's were in use?
    b. Were there about 3 radios for every TV set?

38. Many major league players use a 42-inch bat. How many feet is this?

39. The average time to get to first base in baseball is 4 seconds for a right-handed hitter and 3.8 seconds for a left-handed hitter. How much faster can a left-handed hitter get there than a right-handed hitter? Can you account for this difference?

40. $12.49 + $24.50 + $42.80 + $7.25

41. 23.1 + 47.29 + 85 + 67.03 + 92

42. From $118.60 take $79.95.

43. From $250 take $105.78.

44. $\begin{array}{r} 3.02 \\ \underline{\times\ .15} \end{array}$ 45. $\begin{array}{r} .203 \\ \underline{\times\ .3} \end{array}$ 46. $.8\overline{)\,.032}$ 47. $6\overline{)\,.084}$

48. $.24\overline{)\,12.8}$ 49. $3.1\overline{)\,9.08}$

50. On a train trip, the train traveled 46.2 miles per hour for 12 hours. How long was the trip?

51. A tank car holds an average of 8,824 gallons of oil. If a train is hauling 37 tank cars, how many gallons are being hauled?

52. How much cheaper is it to subscribe to a weekly magazine at $7.50 a year than to buy it at the newsstand every week for 25¢ a copy?

53. School trips to museums have become very popular. If a school trip costs $27.00 for 45 pupils, what is the cost for each pupil?

54. Match a number from the examples with each word listed **at the** top of the next page:

$\begin{array}{r}4\\5\overline{)20}\end{array}$ $\begin{array}{r}6\\\times 3\\\hline 18\end{array}$ $\begin{array}{r}1\\+7\\\hline 8\end{array}$ $\begin{array}{r}19\\-17\\\hline 2\end{array}$ $\frac{11}{9}$ $13\frac{10}{13}$ $.1$

a. mixed number
b. sum
c. proper fraction
d. divisor
e. tenths
f. product
g. difference
h. numerator
i. denominator
j. improper fraction
k. quotient
l. decimal

55. What fraction shows that one thing has been divided into 8 equal parts and you are using 5 of them?

56. In a championship football or baseball (World Series) game, part of the money collected is given to the players. In a recent championship football game between Cleveland and Detroit, the Cleveland team divided $120,854 among 44 players and the Detroit team divided $181,232 among its 42 players.

a. Who do you think won the game? Why?
b. How much did each Detroit player get?
c. How much did each Cleveland player get?
d. How much more did each Detroit player get than each Cleveland player?

57. Circle Yes or No.

a. Yes No A proper fraction is always more than one.

b. Yes No Ten is the base of our number system.

c. Yes No Any 2-place decimal is read as hundredths.

d. Yes No A proper fraction can always be reduced.

58. The table shows the number of calories boys and girls need each day to keep up their energy. The number of calories needed depends on the weight of the boy or girl. The table gives the number of calories needed for each pound of weight.

Calories per Pound

Age	Boys	Girls
10-13	29	29
14-15	26	22
16-17	26	19
18-19	24	16

Example: Mary Brown, age 15, weighs 109 pounds. How many calories does she need per day?

Solution: From the table opposite age 15 and under column headed "Girls" the number of calories Mary needs per pound is 22. Since Mary weighs 109 pounds we multiply 109 by 22. Mary needs 2,398 calories per day.

$$\begin{array}{r}109\\\times\ 22\\\hline 218\\218\ \\\hline 2398\end{array}$$

Find the number of calories needed in each case:

a. John Ginn, age 15, weight 126 pounds
b. Helen Warren, age 19, weight 124 pounds
c. Jack Darling, age 13, weight 112 pounds
d. Mary Sutton, age 17, weight 111 pounds

59. In a certain town the monthly rate for a telephone is as follows: $3.85 for the first 40 calls and 5¢ each for all calls over 40 each month. Add 10% Federal Tax.

Example: Mrs. Smith made 48 phone calls last month. How much was her phone bill?

Solution: a. Find the number of calls over 40.
b. Each of these costs 5¢.
c. Find the total charge for phone service.
d. Find 10% Federal Tax.
e. Find the total bill.

a. $\begin{array}{r} 48 \\ -\ 40 \\ \hline 8 \end{array}$ b. $\begin{array}{r} \$0.05 \\ .\ \times\ 8 \\ \hline \$0.40 \end{array}$

c. $\begin{array}{r} \$3.85 \\ +\ .40 \\ \hline \$4.25 \end{array}$

d. $\begin{array}{r} \$4.25 \\ \times\ .10 \\ \hline 0\ 00 \\ 42\ 5 \\ \hline \$0.42\ 50 \end{array}$ (10%) or $0.43

e. $\begin{array}{r} \$4.25 \\ +\ .43 \\ \hline \$4.68 \end{array}$

Find the monthly phone bill in each of the following:

a. Mrs. Henry, 53 calls
b. Mrs. Sweeney, 66 calls
c. Mrs. Allison, 78 calls
d. Mrs. McCarthy 92 calls

60. Write as decimals:

a. 15% b. 74% c. 2% d. 99% e. 1%

61. Write as per cents:

a. .25 b. .95 c. .03 d. .09 e. .15

62. Write as fractions reduced to lowest terms:

a. 55% b. 80% c. 6% d. 1%

63. Write as per cents:

a. $\frac{1}{4}$ b. $\frac{3}{10}$ c. $\frac{14}{1000}$ d. $\frac{2}{5}$

64. Find:

a. 40% of $220 c. 99% of 120 e. 23% of 825

b. 18% of 67 d. 1% of 84 f. 6% of 98

65. Change each per cent to a fraction and a decimal:

a. 25% b. 60% c. 95% d. 20%

66. In a certain city, 18% of the high school graduates go to college. If the last graduating class had 240 pupils, how many went on to college?

67. A hi-fi set was reduced 20%. If the original price was $229, how much was it reduced? What was the sale price?

68. Mr. Gearon's annual pay is $6,400. He allows 32%%of his budget for food. How much is allowed each year for food? How much per month?

69. In Illinois you must pay a $3\frac{1}{2}$% sales tax on all your purchases. The table shows the tax schedule.

Purchase	Tax	Purchase	Tax
From $0.13 to $0.37	$0.01	From $1.24 to $1.54	$0.05
From $0.38 to $0.63	$0.02	From $1.55 to $1.85	$0.06
From $0.64 to $0.93	$0.03	From $1.86 to $2.14	$0.07
From $0.94 to $1.23	$0.04	From $2.15 to $2.42	$0.08

How much tax would you pay on each purchase?

a. $0.95 c. $1.30 e. $0.75 g. $1.75

b. $2.16 d. $0.14 f. $2.13 h. $0.12

70. A speed skater covered .75 mile in 2.3 minutes. Find the distance covered in one minute?

71. Mr. Harris bought an automobile for $1947. He paid $\frac{1}{3}$ of the amount in cash. How much did he pay in cash? How much was left to pay?

72. Bricks are sold by the thousand. If the cost is $28.75 per thousand, find the cost of:

a. 1,000 bricks b. 2,000 bricks c. 5,000 bricks

73. Statistics show that recovery is complete in $\frac{3}{4}$ of all cases of cancer diagnosed early. Of 4,000 cases diagnosed early, how many should recover completely?

74. The Indianapolis Speedway is the scene every year of the famous 500-mile race. How many times does a car have to go around the track to travel 500 miles if the distance around the track is $2\frac{1}{2}$ miles?

75. The normal pulse of an adult is 72 and of an 11-year old, 85. How much faster is the pulse of the 11-year old?

76. A bricklayer worked 36 hours at $2.75 per hour. How much did he earn?

77. Americans have been steadily increasing the number of purchases on credit. The table shows what per cent of purchases were bought for cash and what per cent were paid for on time payments.

ITEM	TIME PAYMENTS	CASH
Automobiles	64%	36%
Television Sets	50%	50%
Boats	52%	48%

a. What is the total per cent for each item?
b. Do people buy more automobiles on time or pay cash?
c. Of the items listed, which one is paid for oftener in cash?
d. Would you say that one-half the TV sets are bought on time?
e. Which item is purchased the most often on time payments?

78. The 1959 season was the 25th year for the band concerts in Grant Park. That year 323,600 persons attended 29 concerts. What was the average number per concert?

79. A popcorn factory with 28 tons of popcorn burned down. How many pounds of popcorn is that?

80. 39,005
− 1,820

81. 3,801
x 501

82. 66/ 5441

83. 1.2/ 7.2

84. $3,878.17
1,459.24
673.39
4,521.42
+ 8,769.75

85. $6\frac{3}{4} + 1\frac{5}{8}$

86. $9\frac{1}{8} - 3\frac{1}{2}$

87. $\frac{1}{2}$ of $3\frac{1}{2}$

88. $3 \div 1\frac{1}{5}$

89. $902.26
− 412.77

90. .0096
x 1.3

91. .8/ 20

92. .75/ .15

93. .032/ 1.6

94. 1.2/ 25.2

95. Write as decimals:

a. 49%
b. 98%
c. 3%
d. 72%
e. 4%
f. 1%

Fill in the blank spaces:

96. 2 quarts = _______ pints

97. 6 feet = _________ yards

98. 4000 pounds = _____ tons

99. 1 year = _________ weeks

100. 72 inches = ______ yards

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Practice, review, and enrichment materials for supplementing this course in *Basic Mathematics* may be found in the approved and auxiliary arithmetic textbooks, Grades 5 to 7.

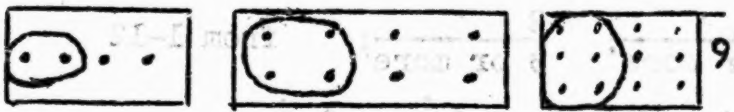
ANSWERS FOR BASIC MATHEMATICS II

ASSIGNMENT 1

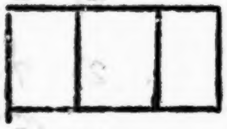
1) $\frac{1}{4}$; $\frac{1}{6}$; $\frac{1}{3}$; $\frac{1}{8}$; $\frac{1}{2}$ 2) $\frac{2}{3}$, two thirds; $\frac{1}{4}$, one fourth; $\frac{1}{2}$, one-half; $\frac{3}{8}$, three eighths; $\frac{5}{6}$, five sixths 3) $\frac{1}{3}$; $\frac{3}{4}$; $\frac{1}{2}$; $\frac{5}{8}$; $\frac{1}{6}$ 4) $\frac{1}{6}$

5) number; size 6) $\frac{3}{8}$; $\frac{3}{4}$; $\frac{1}{2}$ 7) a. $\frac{1}{3}$, $\frac{3}{4}$, $\frac{3}{8}$, $\frac{2}{6}$; b. $\frac{2}{3}$, $\frac{1}{4}$, $\frac{5}{8}$, $\frac{4}{6}$

8)



9) 5; $\frac{2}{5}$; $\frac{3}{5}$ 10) a; d 11)



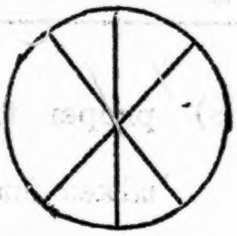
12) a; e

ASSIGNMENT 2

1) parts; whole 2) $\frac{1}{2}$; $\frac{1}{3}$; $\frac{1}{4}$, etc. 3) $\frac{1}{8}$; $\frac{2}{8}$; $\frac{3}{8}$, etc. 4) $\frac{1}{3}$ 5) $\frac{5}{6}$

6) $\frac{2}{\textcircled{3}}$; $\frac{5}{\textcircled{6}}$; $\frac{8}{\textcircled{9}}$; $\frac{5}{\textcircled{13}}$ 7) $\frac{1}{\textcircled{4}}$; $\frac{2}{\textcircled{5}}$; $\frac{5}{\textcircled{6}}$; $\frac{1}{\textcircled{2}}$ 8) $\textcircled{\frac{5}{6}}$; $\textcircled{\frac{2}{6}}$; $\textcircled{\frac{1}{6}}$ 9) $\textcircled{\frac{3}{9}}$; $\textcircled{\frac{3}{8}}$; $\textcircled{\frac{3}{11}}$

10) $\frac{\text{numerator}}{\text{denominator}}$ 11)



12) 8; $\frac{3}{8}$; $\frac{5}{8}$

ASSIGNMENT 3

1) $\frac{1}{2}$; $\frac{1}{8}$; $\frac{1}{2}$; $\frac{3}{4}$; $\frac{9}{16}$; $\frac{5}{8}$; $\frac{3}{8}$; $\frac{9}{16}$; $\frac{7}{8}$; $\frac{3}{4}$; $\frac{7}{8}$; same

2) a. $\frac{1}{2}$ $\frac{9}{16}$ $\frac{5}{8}$ $\frac{11}{16}$ $\frac{3}{4}$ $\frac{4}{4}$ b. $\frac{1}{8}$ $\frac{5}{16}$ $\frac{1}{2}$ $\frac{3}{4}$ $\frac{15}{16}$ $\frac{8}{8}$

3)

<table>
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4) $\frac{1}{3}$; $\frac{1}{6}$; $\frac{5}{6}$; $\frac{8}{12}$; $\frac{5}{6}$; $\frac{11}{12}$; $\frac{12}{12}$; same

5) $\frac{2}{4}$, $\frac{4}{8}$; $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{8}$, etc.; $\frac{3}{4}$, $\frac{5}{8}$, $\frac{12}{16}$; $\frac{1}{2}$, $\frac{5}{16}$, $\frac{3}{8}$, etc.

6) $\frac{2}{7}$; $\frac{1}{3}$; $\frac{1}{5}$; $\frac{1}{2}$; $\frac{1}{2}$; $\frac{1}{2}$; $\frac{1}{3}$; $\frac{1}{8}$; $\frac{1}{4}$; $\frac{1}{4}$; $\frac{3}{5}$; $\frac{1}{5}$

7) 3; 2; 7; 2; 7; 3 8) $\textcircled{\frac{3}{5}}$; $\textcircled{\frac{5}{8}}$; $\textcircled{\frac{12}{19}}$; $\textcircled{\frac{3}{5}}$

9) $\frac{6}{18} = \frac{1}{3}$, $\frac{12}{16} = \frac{3}{4}$, $\frac{14}{21} = \frac{2}{3}$ 10) 4; 6; 4; 10; 15; 6; 4; 14

11) $\frac{2}{6}$; $\frac{3}{9}$ $\frac{4}{12}$; $\frac{5}{15}$; etc. 12) lowest; multiplying; dividing

ASSIGNMENT 3 (Continued)

13) 10; 12; 16; 18; 4; 20   14) $\frac{3}{12}$; $\frac{4}{12}$; $\frac{6}{12}$; $\frac{9}{12}$ 15) $\enclose{circle}{\frac{1}{2}}$; $\enclose{circle}{\frac{3}{8}}$; $\enclose{circle}{\frac{2}{9}}$

16) 3; 5; 2   17) b   18) $\enclose{circle}{\frac{2}{4}}$; $\enclose{circle}{\frac{4}{8}}$; $\enclose{circle}{\frac{3}{6}}$; $\enclose{circle}{\frac{5}{10}}$

ASSIGNMENT 4

1) 1 or 2;   1,2,3, or 4; $\frac{5}{6 \text{ or more}}$; $\frac{2}{3 \text{ or more}}$;   from 1-12

2) 7 or more;   3 or more;   15 or more;   1-6;   1-7

3) $\enclose{circle}{\frac{2}{3}}$; $\enclose{circle}{\frac{5}{8}}$; $\enclose{circle}{\frac{6}{8}}$ 4)

WHOLE NUMBERS	PROPER FRAC.	IMPROPER	MIXED
8 13	$\frac{5}{8}$ $\frac{5}{9}$ $\frac{8}{13}$	$\frac{7}{6}$ $\frac{14}{11}$ $\frac{7}{7}$	$1\frac{2}{3}$ $2\frac{5}{6}$
	$\frac{3}{4}$	$\frac{9}{9}$ $\frac{4}{3}$	$2\frac{9}{10}$

5) $3\frac{1}{2}$; 1; $1\frac{1}{5}$; 1; $1\frac{1}{3}$; $1\frac{3}{4}$ 6) proper fraction, $\frac{3}{4}$; improper fraction, 8
mixed number, $1\frac{3}{4}$; whole number, 7

7) numerator; improper; lowest terms; improper   8) No   9) Yes

10) $\frac{1}{3}$, $\frac{2}{7}$, $\frac{3}{4}$, etc.; $\frac{5}{3}$, $\frac{9}{7}$, $\frac{8}{4}$, etc.; $2\frac{1}{3}$, $5\frac{1}{4}$, $9\frac{7}{8}$, etc.;   7, 19, 43, etc.

ASSIGNMENT 5

1) 4,421 lb.   2) 13 in.   3) 154 mi.   4) 1,168 mi.   5) $59.75

6) 319,061 sq. mi.   7) 12,488 lb.   8) 360 lb.   9) $138.72   10) 8,544

11) 13   12) 50   13) 215   14) $.16   15) $.70   16) $15   17) 720

18) 600   19) $11.52   20) $3.50   21) $2.55   22) 109 lb.   23) $89.45

24) 13   25) 475 mi.   26) 462   27) 18

ASSIGNMENT 6

1) $\frac{4}{5}$ 2) $\frac{5}{6}$ 3) $\frac{5}{8}$ 4) $\frac{3}{4}$ 5) $\frac{3}{10}$ 6) $\frac{7}{8}$ 7) $\frac{3}{5}$ 8) $13\frac{7}{8}$ 9) $16\frac{8}{9}$

10) $14\frac{7}{8}$ 11) $10\frac{4}{5}$ 12) $19\frac{5}{12}$ 13) $30\frac{8}{9}$ 14) $6\frac{9}{10}$ 15) $23\frac{7}{16}$ 16) $\frac{1}{2}$ 17) $\frac{3}{4}$

18) $\frac{1}{2}$ 19) $\frac{1}{2}$ 20) $\frac{1}{8}$ 21) $\frac{2}{5}$ 22) $\frac{1}{6}$ 23) $17\frac{2}{3}$ 24) $25\frac{2}{5}$ 25) $37\frac{1}{4}$

26) $11\frac{1}{3}$ 27) $23\frac{3}{5}$ 28) $41\frac{1}{3}$ 29) $33\frac{3}{4}$ 30) $28\frac{1}{2}$ 31) $1\frac{3}{10}$ 32) $1\frac{1}{8}$

33) $1\frac{1}{6}$ 34) $1\frac{2}{5}$ 35) $1\frac{1}{12}$ 36) $1\frac{5}{8}$ 37) 1 38) 1 39) $42\frac{3}{8}$ 40) $46\frac{1}{5}$

41) $32\frac{1}{6}$ 42) $81\frac{1}{6}$ 43) $28\frac{3}{8}$ 44) 21 45) 12 46) $1\frac{1}{2}$ 47) $1\frac{1}{5}$ 48) $1\frac{1}{2}$

49) $1\frac{2}{3}$ 50) $1\frac{3}{4}$ 51) $41\frac{1}{4}$ 52) $9\frac{1}{3}$ 53) $93\frac{2}{5}$ 54) $17\frac{1}{8}$ 55) $74\frac{1}{4}$ 56) $10\frac{1}{5}$

57) $23\frac{1}{2}$ 58) $66\frac{1}{4}$ 59) $16\frac{3}{5}$ 60) $34\frac{1}{6}$ 61) $19\frac{1}{6}$ 62) $43\frac{4}{5}$ 63) $16\frac{1}{2}$

64) $9\frac{3}{7}$ 65) $6\frac{2}{3}$ 66) $\frac{1}{2}$ mi. 67) 23 gallons 68) $\frac{1}{2}$ 69) $3\frac{1}{2}$ yd. 70) $\frac{2}{5}$

71) 4 hours 72) $2\frac{3}{4}$ mi. 73) $12\frac{1}{4}$ hours 74) 15 yd. 75) 2 mi.

ASSIGNMENT 7

1) 2; 2; 6; 2; 10 2) 3; 2; 8; 3 3) 2; 2; 8; 10 4) 4 5) 3

6) 2 7) 4 8) $\frac{11}{16}$ 9) $\frac{3}{4}$ 10) $\frac{5}{8}$ 11) $\frac{7}{8}$ 12) $9\frac{5}{6}$ 13) $10\frac{7}{8}$

14) $12\frac{7}{8}$ 15) $16\frac{1}{8}$ 16) $15\frac{5}{8}$ 17) $16\frac{1}{4}$ 18) $19\frac{1}{6}$ 19) $17\frac{1}{2}$ 20) $17\frac{5}{6}$

21) $1\frac{5}{12}$ 22) $1\frac{1}{6}$ 23) $1\frac{1}{10}$ 24) $\frac{11}{12}$ 25) $1\frac{1}{12}$ 26) $1\frac{7}{12}$ 27) $9\frac{11}{12}$

28) $15\frac{1}{10}$ 29) $13\frac{1}{6}$ 30) $17\frac{1}{3}$ 31) $\frac{3}{16}$ 32) $\frac{9}{16}$ 33) $\frac{7}{16}$ 34) $\frac{13}{16}$ 35) $1\frac{7}{16}$

36) $\frac{7}{16}$ 37) $22\frac{13}{16}$ 38) $29\frac{3}{8}$ ft. 39) $5\frac{7}{8}$ yd. 40) $1\frac{5}{12}$ 41) $7\frac{3}{4}$ in.
42) $15\frac{1}{4}$ 43) $7\frac{3}{4}$ 44) 7 45) $7\frac{3}{4}$

ASSIGNMENT 8

1) $\frac{3}{5}$ 2) $\frac{2}{9}$ 3) $\frac{3}{4}$ 4) $\frac{1}{4}$ 5) $\frac{1}{3}$ 6) $\frac{2}{5}$ 7) 0 8) $3\frac{1}{5}$ 9) $6\frac{2}{7}$ 10) $4\frac{1}{5}$

11) $4\frac{2}{3}$ 12) $\frac{1}{4}$ 13) $7\frac{1}{5}$ 14) $3\frac{1}{6}$ 15) $\frac{1}{2}$ 16) $\frac{1}{3}$ 17) $\frac{1}{6}$ 18) $\frac{3}{8}$ 19) $\frac{3}{8}$

20) $6\frac{4}{9}$ 21) $6\frac{5}{9}$ 22) $3\frac{2}{5}$ 23) $2\frac{1}{2}$ 24) $4\frac{1}{2}$ 25) $8\frac{1}{5}$ 26) $6\frac{2}{7}$ 27) 2

28) 9 29) $3\frac{2}{3}$ 30) $8\frac{1}{5}$ 31) $\frac{1}{2}$ 32) $\frac{1}{3}$ 33) 8 34) $\frac{2}{5}$ 35) $25\frac{1}{8}$

36) $74\frac{1}{2}$ 37) $\frac{3}{4}$ lb. 38) $1\frac{1}{2}$ 39) $1\frac{1}{6}$ hours 40) $2\frac{1}{4}$ inches 41) $44\frac{3}{5}$ miles

42) $\frac{1}{2}$ inch

ASSIGNMENT 9

1) $7\frac{3}{5}$ 2) $6\frac{2}{3}$ 3) $\frac{5}{9}$ 4) $4\frac{2}{5}$ 5) $2\frac{2}{3}$ 6) $4\frac{3}{7}$ 7) $3\frac{2}{3}$ 8) $8\frac{4}{5}$ 9) $7\frac{1}{4}$

10) $2\frac{1}{2}$ 11) $3\frac{5}{6}$ 12) $2\frac{3}{4}$ 13) $2\frac{3}{5}$ 14) $5\frac{1}{3}$ 15) $\frac{1}{2}$ 16) $2\frac{3}{4}$ 17) $6\frac{5}{8}$

18) $5\frac{5}{6}$ 19) $5\frac{7}{8}$ 20) $5\frac{7}{10}$ 21) $2\frac{5}{8}$ 22) $6\frac{2}{3}$ 23) $4\frac{1}{2}$ 24) $6\frac{3}{4}$ 25) $6\frac{11}{12}$

26) $3\frac{5}{6}$ 27) $3\frac{11}{12}$ 28) $1\frac{7}{10}$ 29) $5\frac{7}{12}$ 30) $1\frac{5}{6}$ 31) $3\frac{11}{12}$ 32) $3\frac{9}{10}$ 33) $2\frac{3}{4}$

34) $4\frac{1}{2}$ 35) $11\frac{5}{8}$ 36) $1\frac{5}{12}$ 37) $13\frac{3}{5}$ 38) $16\frac{3}{8}$ 39) $2\frac{1}{4}$ 40) $6\frac{1}{2}$ 41) $10\frac{7}{8}$

42) $9\frac{7}{12}$ 43) $\frac{2}{5}$ 44) $\frac{3}{4}$ 45) $\frac{3}{10}$ 46) $\frac{1}{2}$ 47) $45\frac{3}{8}$ 48) $46\frac{5}{8}$ 49) $9\frac{9}{16}$

50) $10\frac{7}{16}$ 51) $3\frac{11}{12}$, $8\frac{11}{8}$, $2\frac{7}{8}$ 52) $\frac{11}{12}$; $6\frac{1}{4}$; $1\frac{7}{8}$ 53) $1\frac{3}{4}$ qt. 54) $1\frac{7}{8}$ cups

55) $2\frac{3}{4}$ ft. 56) $4\frac{1}{2}$ lb. 57) $7\frac{3}{4}$ in. 58) $6\frac{7}{8}$ in. 59) $1\frac{3}{16}$ in. 60) $6\frac{2}{5}^\circ$; $3\frac{1}{10}^\circ$; $1\frac{7}{10}^\circ$ $\frac{4}{5}^\circ$; $\frac{1}{2}^\circ$; $\frac{3}{5}^\circ$ 61) 6 lb. 63) 47 lb. 64) $\frac{5}{16}$ ft. 65) $\frac{7}{8}$ ft.

66) $1\frac{1}{2}$ sec. 67) $1\frac{3}{4}$ lb. 68) $6\frac{1}{4}$ in. 69) $4\frac{1}{2}$ min. 70) $3\frac{2}{3}$ ft. 71) $\frac{1}{4}$ lb.

72) $3\frac{1}{2}$ ft.

ASSIGNMENT 10

1) $1\frac{1}{2}$ 2) $1\frac{3}{4}$ 3) $\frac{4}{5}$ 4) 1 5) 2 6) $\frac{1}{2}$ 7) $1\frac{4}{5}$ 8) 6 9) $1\frac{2}{3}$ 10) 1

11) $5\frac{1}{4}$ 12) 3 13) 3 14) 8 15) 2 16) $3\frac{1}{2}$ 17) $3\frac{3}{5}$ 18) 6 19) 9

20) 2 21) $\frac{39}{4}$ 22) $\frac{22}{7}$ 23) $\frac{67}{8}$ 24) $\frac{65}{6}$ 25) $\frac{27}{5}$ 26) $\frac{28}{9}$ 27) $\frac{23}{3}$

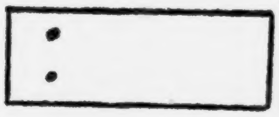
28) $\frac{37}{6}$ 29) $\frac{15}{8}$ 30) $\frac{13}{5}$ 31) $\frac{19}{4}$ 32) $\frac{10}{3}$ 33) $6\frac{3}{5}$ 34) $5\frac{1}{2}$ 35) 10

36) 15 37) $9\frac{1}{3}$ 38) $6\frac{3}{4}$ 39) 14 40) 27 41) $40\frac{1}{2}$ 42) $13\frac{1}{2}$ 43) 20

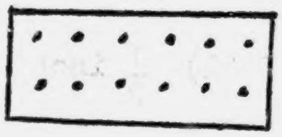
44) $13\frac{1}{3}$ 45) 20 46) $8\frac{1}{2}$ 47) 25 48) $6\frac{2}{3}$ 49) $8\frac{1}{2}$ 50) $9\frac{1}{3}$

51) 2 dozen 52) $2.25 53) 112 in. 54) 4 yd. 55) $\frac{2}{3}$ doz.; $1\frac{1}{3}$ doz.

56) $7\frac{1}{2}$ hr. 57) 1.B; 2.C; 3.A 58) A



B



59) $\frac{2}{3} \times 4 = \frac{8}{3} = 2\frac{2}{3}$ 60) same

ASSIGNMENT 11

1) $\frac{1}{4}$ 2) $\frac{1}{6}$ 3) $\frac{5}{8}$ 4) $\frac{1}{12}$ 5) $\frac{4}{9}$ 6) $\frac{3}{10}$ 7) $\frac{5}{12}$ 8) $\frac{1}{5}$ 9) $\frac{9}{16}$

10) $\frac{1}{4}$ 11) $\frac{3}{16}$ 12) $\frac{1}{2}$ 13) $\frac{1}{30}$ 14) $\frac{1}{20}$ 15) $\frac{1}{2}$ 16) $\frac{1}{12}$ 17) $\frac{49}{64}$

18) $\frac{1}{12}$ 19) $\frac{1}{2}$ 20) $\frac{1}{18}$ 21) $\frac{1}{10}$ 22) $\frac{2}{3}$ 23) $\frac{1}{3}$ 24) $\frac{1}{8}$ 25) $1\frac{3}{4}$

26) $1\frac{1}{5}$ 27) 5 28) 2 29) $\frac{5}{6}$ 30) $\frac{3}{8}$ 31) $7\frac{1}{5}$ 32) $7\frac{1}{12}$ 33) 6

34) 4 35) $1\frac{1}{2}$ 36) $3\frac{3}{8}$ 37) 18 38) 12 39)
$\frac{1}{4}$ cup butter
$\frac{1}{2}$ cup sugar
1 egg
$\frac{1}{4}$ cup molasses
$\frac{1}{4}$ cup boiling water
1 cup flour
$\frac{3}{4}$ tsp. ginger
$\frac{1}{2}$ tsp. nutmeg
$\frac{1}{4}$ tsp. salt
1 tsp. soda

40) ⑰; $\frac{15}{⑤}$; $\frac{\overset{②}{\cancel{24}}}{\underset{3}{\cancel{9}}}$; ④ 41) 16, $3\frac{3}{4}$, 1, $\frac{1}{4}$

42) 26¢ 43) 8 hr. 44) $67\frac{1}{2}$ mph 45) $1\frac{5}{6}$ lb.; $3\frac{2}{3}$ lb. 46) 15 lb.; 5 lb.;

47) 12 48) \$2.50; \$7.50 49) 125 50) $1\frac{1}{2}$ mi. 51) 36 min.

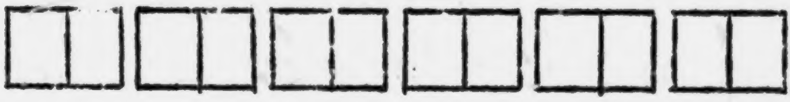
52) 38 ft. 53) dividing 54) 2 55) 42 56) 30¢ 57) \$1.20 58) 63

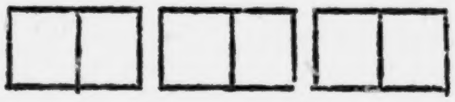
59) \$600 60) \$1; \$2.50; \$5.00; \$25; \$50; \$5,000 61) 54¢ 62) 39

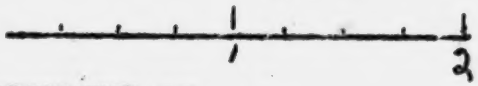
63) 20 lb.; 16 lb.; 25 lb.; 14 lb. 65) $12\frac{1}{2}$

ASSIGNMENT 12

1) 2; 4; 4; 8 2) 2; 4; 4; 8 3) 8; 16; 32 4) 8; 16; 32

5)  ; 12; 3

6) 6; 8; 40 7)  8) 6

9) 

10) 4; 9; 5

ASSIGNMENT 13

1) $\frac{8}{15}$ 2) $2\frac{5}{8}$ 3) $\frac{3}{5}$ 4) 6 5) 3 6) 3 7) $1\frac{1}{9}$ 8) $1\frac{1}{2}$ 9) $\frac{1}{3}$

10) 2 11) $\frac{1}{4}$ 12) $\frac{3}{20}$ 13) $\frac{3}{10}$ 14) $\frac{3}{7}$ 15) $\frac{14}{27}$ 16) 25 17) $15\frac{1}{3}$

18) $13\frac{3}{4}$ 19) $9\frac{1}{6}$ 20) 30 21) $1\frac{1}{2}$ 22) 7 23) $1\frac{1}{2}$ 24) $\frac{11}{18}$ 25) 6

26) $\frac{1}{8}$ 27) $\frac{1}{8}$ 28) $\frac{1}{8}$ 29) $\frac{3}{16}$ 30) $\frac{2}{15}$ 31) $1\frac{7}{12}$ 32) $4\frac{3}{4}$ 33) $1\frac{9}{10}$ 34) $1\frac{3}{8}$

35) $\frac{3}{4}$ 36) $6\frac{2}{5}$ 37) 4 38) 16 39) 24 40) 40 41) $2\frac{2}{9}$ 42) $\frac{4}{5}$

43) $1\frac{1}{3}$ 44) $1\frac{7}{9}$ 45) ④, ⑨, ($\frac{1}{2}$,) ($\frac{1}{4}$) 46) divisor was not inverted 47) 6

48) 14 49) $\frac{7}{1}$; $\frac{4}{1}$; $\frac{9}{1}$; $\frac{5}{1}$; $\frac{3}{1}$ 50) $\frac{1}{7}$; $\frac{1}{4}$; $\frac{1}{9}$; $\frac{1}{5}$; $\frac{1}{3}$ 51) 64 52) $\frac{2}{3}$

53) $\frac{4}{3}$; $\frac{6}{5}$; $\frac{7}{8}$; $\frac{9}{13}$ 54) $\frac{3}{8}$ 55) $1\frac{1}{2}$ ft. 56) 24 57) 6 58) 31, $4\frac{3}{7}$; 30, $4\frac{2}{7}$; 31, $4\frac{3}{7}$; 30, $4\frac{2}{7}$

ASSIGNMENT 14

1) numerator; denominator 2) improper; whole number; mixed number; proper fraction 3) 60¢ 4) $3\frac{1}{2}$ mi. 5) $2 \div \frac{1}{4}$; $4 \div 8$ 6) 14 7) $5\frac{1}{4}$ hr. 8) 24 9) common denominator; multiply or divide; mixed number 10) $\frac{3}{4}$; $\frac{6}{10}$; $\frac{4}{5}$

11) 16 12) $2\frac{1}{3}$ 13) $8\frac{3}{4}$ 14) $\frac{1}{2}$ 15) $1\frac{2}{3}$ 16) $\frac{3}{10}$ 17) 5 18) 32

19) $16\frac{7}{12}$ 20) $4\frac{2}{3}$ 21) $3\frac{13}{16}$ 22) $2\frac{7}{12}$ 23) $21\frac{1}{4}$ 24) $\frac{3}{8}$ 25) 183 26) 20

27) $100\frac{7}{12}$ 28) $1\frac{7}{8}$ 29) $7\frac{7}{8}$ 30) $5\frac{5}{8}$ 31) 6 32) 4 33) $\frac{25}{96}$ 34) $2\frac{5}{9}$

35) $17\frac{5}{8}$ 36) $12\frac{1}{4}$ 37) $7\frac{5}{6}$ 38) $\frac{1}{4}$ 39) $\frac{7}{26}$ 40) $\frac{1}{18}$ 41) $4\frac{7}{8}$ 42) 25

43) $11\frac{1}{8}$ 44) $6\frac{7}{12}$ 45) $7\frac{5}{12}$ 46) $45\frac{5}{12}$ 47) 9 48) 39 49) $\frac{3}{4}$ 50) $\frac{1}{2}$

ASSIGNMENT 15

1) 1,201 2) 40 3) 8,091 4) 56 5) \$1.09 6) \$154.87

7) \$34,327.51 8) \$1157.56 9) \$3.55 10) \$3.00 11) 37,532

12) 1,372 13) 47,257 14) 75r6 15) 32r45 16) 666r28 17) $2\frac{1}{3}$

18) $12\frac{1}{4}$ 19) 23 20) 2000 21)

$$\begin{array}{rlrlrl} 7 & \text{addend} & 12 & \text{minuend} & 4 & \text{multiplicand} \\ \underline{+3} & \text{addend} & \underline{-8} & \text{subtrahend} & \underline{x9} & \text{multiplier} \\ 10 & \text{sum} & 4 & \text{difference} & 36 & \text{product} \end{array}$$

$$\begin{array}{rl} & \underline{11}\ \text{quotient} \\ \text{divisor } 6 & \overline{)66}\ \text{dividend} \end{array}$$

22) 32 23) 10¢ 24) 1008 pennies; \$10.08

25) 6,371 26) Tribune; American; 335,221; 61,840; 26) 584; 61,840

27) 3,740 28) 95 29) 508 30) \$1,414.30 31) \$8.67 32) 5,060

33) \$7.91 34) \$464.75 35) $\frac{4}{7}$ 36) 9 37) 14 38) $3\frac{1}{2}$ 39) $1\frac{3}{4}$

40) $7\frac{7}{8}$ 41) $4\frac{7}{10}$ 42) $4\frac{1}{2}$ 43) $5\frac{1}{2}$ 44) $9\frac{1}{2}$ 45) $9\frac{1}{2}$ 46) $17\frac{1}{2}$ 47) $2\frac{4}{5}$

48) $\frac{5}{14}$ 49) $17\frac{1}{2}$ 50) $\frac{5}{18}$

ASSIGNMENT 16

1.

1	3	▨	1	▨	▨	1
0	▨	2	$\frac{3}{8}$	▨	6	$\frac{1}{6}$
▨	5	$\frac{3}{5}$	▨	2	$\frac{2}{3}$	▨
1	$\frac{5}{6}$	▨	3	$\frac{5}{8}$	▨	1
▨	▨	5	$\frac{1}{3}$	▨	2	$\frac{3}{4}$
▨	1	$\frac{11}{12}$	▨	7	$\frac{1}{12}$	▨
1	$\frac{5}{16}$	▨	1	$\frac{5}{8}$	▨	▨

2.

$\frac{7}{16}$		$\frac{5}{16}$
$\frac{3}{16}$	$\frac{11}{16}$	

3.

4	2	▨	3	1	▨	▨
4	$\frac{1}{2}$	▨	6	$\frac{1}{3}$	▨	1
▨	▨	2	$\frac{5}{6}$	▨	6	9
2	4	$\frac{1}{6}$	▨	2	2	$\frac{1}{2}$
7	$\frac{1}{2}$	▨	5	$\frac{9}{10}$	▨	▨
▨	▨	4	9	▨	2	4
▨	3	9	$\frac{3}{8}$	▨	6	$\frac{2}{3}$

ASSIGNMENT 17

3) two and three tenths; twenty-one and one tenth; sixty-eight and fifty-two hundredths; seven hundred twenty-three and forty-seven hundredths; sixty and nine hundredths; forty-seven and twenty-three thousandths

4) 10.07; 700.012; 106.06; 17.7; .061 5) $\frac{1}{5}$; $\frac{7}{20}$; $\frac{7}{10}$; $\frac{1}{5}$; $\frac{2}{25}$

6) 10; $\frac{3}{10}$; $\frac{7}{10}$; $\frac{9}{10}$; .7, .3, .1 8) .9; .14; .027; .01; .017; .02;

10.5; 12.17; 23.019; 17.04; 83.009; 264.18

9) 675; 10.5; 28.5; $2895.95; 81.7; 104.3; 60.5; 4.7; 26.9

10)

	$\frac{1}{10}$			$\frac{624}{1000}$	$5\frac{8}{10}$			$8\frac{3}{1000}$
.7		.41	.99			12.42	9.07	

11) seven tenths; thirty-four hundredths; three hundredths; fifty hundredths; eight and three tenths; thirty-seven and five tenths

12) .07 .70 .2 .019 .666 13) 8 A.M., NOON, 4 P.M.; 8 P.M.; MIDNIGHT

ASSIGNMENT 18

1) hundreds', tens', ones', tenths', hundredths', thousandths'

2) ones'; tenths'; tens'; hundredths'; 10

3) thousands, hundreds, ones, hundredths

4) .3, .30; .7, .70 5) tenths; hundredths; hundredths; thousandths

6) 10; 100; 1000; 100; 1000 7) 24,700,000; 13,000,000,000, 3,600,000; 159,000,000

7) 24,700,000; 13,000,000,000, 3,600,000; 159,000,000

8) 797 thousands; 979 thousands; 1.8 millions; 1.9 millions; 1.4 millions

9) 1,600,000; 16,200,000; 7,100,000; 103,900,000,000; 1.5 million; 7.6 billion; 2.1 million; 13.9 billion

10) \$.04; \$.17; \$.43; \$.99; \$.25; \$.50; \$.90; \$.35

11) \$3.00; \$7.13; \$32.06; \$4.03; \$19.71 12) 1; .1; 1 13) 6; 5; .3; 5

14) .04, .76, .875, .9; .001, .01, .10, .19; .009, .09, .90, .99; .06; .125, .2, .63 15) .4, .5 and .5 is larger; .5, .2 and .5 is larger

16) .3, 0.3, .300, 0.30; .20, .200, .2 17) 4.50, $\frac{9}{2}$ $4\frac{5}{100}$ $4\frac{5}{10}$

18) .3983, 398.3; 4.276, 4276; 9.989, 9989; 9.009, 9009

19) .5; 17.4; 70.0; 50.0 20) .9, 1.3; 5.0, 5.3; 5.3, 5.5, 5.7; 6.0, 6.2, 6.4 21) 700-799; 200-299; 100-199; 900-999; 400-499

22) Pure Science; Applied Science; Philosophy; Religion; Literature; Art and Recreation; Applied Science; History; Applied Science

23) 6.7; .85; 120.65; 2.25; .98 24) 349 hits out of 1,000, 388 hits out of 1,000, 353 hits out of 1,000; 340 hits out of 1,000; Ted Williams

25) .50, .500; .7, .700; .9, .90; 2.40, 2.400

ASSIGNMENT 19

1) .8 2) .9 3) 2.1 4) 2.2 5) 12.4 6) 6.9 7) 20.5 8) 1.75
9) 1.53 10) 9.02 11) 13.29 12) 7.96 13) 2.373 14) 1.935
15) 14.41 16) 2.1 17) 1.17 18) 1.403 19) 9.041 20) 17.56
21) 13.964 22) 15.932 23) .669 24) 18.513 25) 3.6 mi. 26) 8.9 in.
27) 765.6; 646.5; 95.9 28) 452.82 ft. 29) 36.5 million 30) 1,800,000; 26,200,000; 8,500,000; 36,500,000 31) $9.65; $135.98; $187.18; $1,257.66 32) $295.45 33) 172.4 34) 603 mi. 35) 30.8¢, 30.3¢; 31.1¢; 30.9¢ 36) 29.7¢ 37) $35.25 38) $67.93

ASSIGNMENT 20

1) .3 2) .2 3) .5 4) 6.2 5) .9 6) 2.7 7) 2.4 8) 6.4 9) .7
10) .6 11) .61 12) 2.62 13) 10.38 14) 12.17 15) .202 16) .402
17) .004 18) .004 19) 3.156 20) 6.112 21) 57.3 22) 237.47
23) 3.3 24) .08 25) 1.715 26) 2.8 27) 5.4 28) 13.3 29) 37.83
30) 7.81 31) 7.84 32) 6.8 33) 2.49 34) 5.9 35) 1.66 36) 45.28
37) 2.6 mi. 38) New Orleans; Los Angeles; 1.5 in.; 4 in.; .15 in.; South; West 39) 1.2 40) 8.3 lb. 41) 2.74 mi.; 9.36 mi.; 6.62 mi.; No
42) 2.9 mi.; 5.9 mi.; 2.2 mi.; 1.7 mi.; No 43) 6.9 lb. 44) 7,878 mi.
45) 3¢ 46)

.8		
		1.4
	.2	

47) 3.53 mi. 48) 5.25 in.

ASSIGNMENT 21

1) .9; .1; .25; .07; .325; .012 2) $\frac{9}{10} \times \frac{3}{10} = \frac{27}{100}$ $\frac{3}{100} \times \frac{7}{10} = \frac{21}{1000}$

.9 x .3 = .27 .03 x .7 = .021 .9 x .11 = .099 $\frac{9}{10} \times \frac{11}{100} = \frac{99}{1000}$

ASSIGNMENT 21 (Continued)

3) 5.4 4) 5.6 5) 32.41 6) 2.32 7) 30.6 8) 26.901 9) 3.048

10) 19.61 11) 48.02 12) $44.10 13) 235.17 14) 161.500 15) 356.570

16) 3060.00 17) 2687.10 18) 36504.0 19) 50.325 20) 662.2

21) 29.574 22)2.304 23) 62.727 24) 2.556 25) .06 26) .028

27) .05355 28) .09 29) .04590 30) .06486 31) 2.0 in. 32) 23.5 mi.

33) 210 4 ft. 34) .48 in. 35) 8; 48 36) .0068; 7.209; .042; .315;

.0008 37) $84.00 38) 8 in. 39) $38.95; $50.95; $70.95

40) $62.50 41) 45¢; $2.25; $112.50 42) 62.50 43) $3.90

44) 352.2 in.; No 45) $8,440.64 46) 66 lb. 47) 40.92 lb.;

75.90 lb.; 68.64 lb. 48) 83.125; .341360; .1125

49) 27.90 lb. 50) 210.35 mi.

ASSIGNMENT 22

1) .3 2) .3 3) .6 4) .3 5) .3 6) .8 7) .6 8) 4.4 9) 9.3

10) .12 11) .23 12) 2.27 13) .73 14) 2.24 15) .64 16) .39

17) 2.8 18) 3.6 19) 7.1 20) 8.1 21) 3.5 22) 5.35 23) 2.134

24) .651 25) 9.122 26) 3 27) 3 28) 3 29) 15 30) 56 31) 24

32) 3.4 33) 5.3 34) 1.26 35) 4.6 36) .47 37) 9 38) 3.4

39) 2.4 40) 4.7 41) .27 42) 3.7 43) 6 44) 7.54 45) 1.4

46) .7 47) 9 48) 7.6 49) .81 50) 2.1 51) $.07 52) $.09

53) $3.[illegible]4 54) $.05 55) $.76 56) .007 57) .049 58) .042

59) .0204 60) 4.01 61) .082 62) 90.8 63) .95 64) .75 65) 35

66) 378 67) 705 68) 65 69) 70.5 70) .104 71) .018 72) .075

73) 40 74) 800 75) 700 76) 60.4 ft. 77) 18.5 78) .2 in.

79) .03 in. 80) $.41 81) $.32 82) .042+ in. 83) 50+; 36+; 25+; 21+

84) 110 85) $.96 86) $.20 87) 2.72+ 88) 47+; 32+; 22+ 89) 10+

90) 16; 59+ mi. 91) $.69 92) 1.2

ASSIGNMENT 23

1) 20.16 2) 5.66 3) $5859.00 4) 287.7 5) 11.78 6) 17.23

7) 272.30 8) 384.336 9) .22 10) 30.2 11) .020 12) 21.66

13) 54.006 14) 384.336 15) 5.977 16) 8.1 in. 17) $4.27 18) $1.98

19) $45.50 20) 3.25; .03; 5.5; .01 21) $\frac{3}{5}$; $\frac{11}{20}$; $\frac{1}{100}$; $3\frac{29}{50}$; $\frac{3}{500}$

22) $326.88 23) $1574.77 24) $484.48 25) 1.8 26) $4500 27) $1.75

28) $.85 29) $6.72 30)

	$\frac{3}{100}$		$\frac{324}{1000}$		$6\frac{3}{1000}$
.7		.56		5.07	

31) 6.576

32) 9.072 33) 32.952 34) 1.371

35) .38 in. 36) 2.43 37) 1.79904

38) 2.05 39) 6.93 40) .9 41) 156.00 42) 80 43) 50.668

44) 210 mi. 45)

		24
22		

46) 61.9 mi.; 85.0 mi.; 39.5 mi.; 6.5 mi.; 12.7 mi.; Jim

47) .4; .740; .6; .798; 5.3; .02

48) .012, .12, 1.2; 1.04, 1.4, 10.4; .02, .0205, .025

49) .003 50) 660

ASSIGNMENT 24

1) $17\frac{1}{8}$ 2) 32,566 3) $3\frac{4}{9}$ 4) 18 5) $15\frac{1}{3}$ 6) $\frac{5}{6}$, $\frac{3}{6}$, $\frac{3}{5}$, $\frac{2}{8}$ 7) 3, 2, 1, 1

8) 54 9) Yes; No; No; No 10) $4.48 11) 95,430 1[illegible]) 7 x 5

14) 2,520 15) $235.78 16) $3.58 17) 18,864 18) 40,136 19) 501

20) 74 21) 905 22) 3 23) $13\frac{1}{4}$ 24) $17\frac{1}{4}$ 25) $4\frac{5}{6}$ 26) $1\frac{5}{8}$ 27) $\frac{3}{4}$

28) $\frac{1}{8}$ 29) $10\frac{7}{18}$ 30) 70 31) 3 32) 9 33) $\frac{7}{32}$ 34) $1\frac{4}{5}$ 35) 15 mi.

36) $1\frac{1}{2}$ ft. 37) $1,300; $5,200 38) $99,999, $10,000 39) 57¢ 40) 2,232

41) 4,4[illegible] 42) 25,296 43) 419 44) 390 45) $8.87 46) $117.72

47) 39.07 48) .415 49) 230 mi. 50) .3

ASSIGNMENT 25

2) Of every 100 parts, 99 are pure ingredients; for every 100 traffic deaths last year there will be 5 fewer this year; of every 100 problems on the test, Harry got 90 right; of every $100 Mary earned she saved $20; of every 100 fatal accidents, 85 occur in clear weather

3) $\frac{30}{100}$, .30, 30%; $\frac{78}{100}$, .78, 78%; $\frac{99}{100}$, .99, 99%; $\frac{1}{100}$, .01, 1%

4) $\frac{70}{100}$, .70, 70%; $\frac{22}{100}$, .22, 22%; $\frac{1}{100}$, .01, 1%; $\frac{99}{100}$, .99, 99%

5) .75; .96; .70; .82; .03; .08; .40; .23; .01

6) 25%; 38%; 18%; 40%; 1%; 50%; 2%; 9%; 99%

7) 27% 12%; 3%; 1%; 99%; 80%; 75%; 10%; 50%

8) $\frac{7}{20}$; $\frac{1}{5}$; $\frac{3}{4}$; $\frac{3}{20}$; $\frac{3}{5}$; $\frac{4}{5}$; $\frac{1}{25}$; $\frac{1}{10}$; $\frac{1}{20}$ 9) 25%; 8%; 75%; 25%; 30%; 10%; 98%; 20% 10) everyone was present; cooperate completely; he received all his money back; full guarantee

11) He forgot that per cent means hundredths - 2 decimal places

12) .03; .09; .01 13) hundredths; $\frac{4}{100}$, .04, 4 hundredths; by the hundred; 100

15) $\frac{3}{4}$; $\frac{3}{5}$; $\frac{4}{10}$; $\frac{1}{2}$ 16) 75%; 60% 40% 50%

17) $\frac{1}{4}$, 25%; $\frac{2}{5}$; 40%; $\frac{6}{10}$, 60%; $\frac{1}{2}$, 50% 18) decimal point

19) per cent sign 20) $\frac{1}{25}$, 4%; $\frac{5}{100}$, .05; .10, 10%; $\frac{3}{5}$, 60%; $\frac{3}{4}$, .75; .75, 75%; $\frac{17}{100}$, 85%; $\frac{99}{100}$, .99; .05, 5%; $\frac{19}{25}$, 76%

21) properly; improperly; improperly; improperly; properly

22) 40%; 33%; 52% 23) What means of transportation were used in taking a trip around the world; 100%; add given per cents and subtract total from 100%, 47%; ocean liner, land

24) How people spent their money on recreational activities; 100%; 22%; Sports, Hobbies and Reading

25) 100%; 1%; schools

ASSIGNMENT 26

1) $\frac{1}{2}$; $\frac{1}{5}$; $\frac{2}{3}$; $\frac{3}{4}$; $\frac{1}{10}$; $\frac{1}{4}$; $\frac{1}{3}$ 2) $66\frac{2}{3}\%$; 75%; 10%; 50%; 20%; $33\frac{1}{3}\%$; 25%

3) 4; 27; 7; 6; 20; 7; 16

4) 24; 16; 8; 9; 45; 5; $7\frac{1}{2}$ 5) $18; $12; $108.25; $10; $3; $32

6) $1.00   7) $5.00   8) 40   9) 135   10) 9   11) 162.5 million

12) About 20,000   13) 105; 25%; 35   14) $100.00   15) About 3 million sq. mi.

16) 6; 24

ASSIGNMENT 27

1) .75; .03; .96; .08; .82; .70; .40; .24; .05

2) $15.98; 45.05; 153.00; $20.88; $21.09; $44.10; $235.17; $1,044.00

3) 21.00; 143.55; 17.85; 31.36; 244.23; 334.96; 564.48; 35.84; $47.84;
$1,267.50; $1.84; $596.40

4) $40.00   5) $25.00, $525.00; $22.50, $472.50; $17.50, $367.50;
$15.00, $315.00

6) $.34   7) $860.00   8) $1,100; $91.67   9) $11.00   10) $49.80

11) $3.20; $4.80   12) $9.80; $24.90; $17.35; $10.45; $35.50; $45.00

13) $3.00, $9.00; $12.25, 36.75; $17.25, $51.75; $6.75, $20.25; $1.50,
$4.50; $9.50, $28.50; $3.25, $9.75

14) $1,140.00   15) 200   16) 8; 75%; 24   17) $2.40   18) $390.00

19) $72.50; $217.50   20) $221.25   21) 30,030   22) 50   23) $1470.00

24) Mr. Tuttle; $13   25) $27.90, $306.90; $.70, $7.70; $.30, $3.30;
$.90, $9.90; $2.40, $26.40   26) 81; 2781   27) 9   28) 189

29) 21   30) 5,797   31) 18 mo.   32) 22; 18   33) $22.50   34) $6.80

35) $52.00, $208.00; $17.80, $71.20; $55.80, $223.20   36) $.33; $.69;
$.09; $.57   37) 51   38) 28; 6; 14; 4; 2   39) 14   40) 371; 329

41) $18   42) $13.50; $11.25; $8.70; $15.00

ASSIGNMENT 28

1) $\frac{2}{25}$; $\frac{67}{100}$; $\frac{3}{100}$; $\frac{4}{25}$; $\frac{1}{2}$ 2) .25; .05; .92; .01; .19; .03

3) 44%; 95%; 2%; 50%; 75%; 9% 4) 29%; 3%; 50%; 6%; 1%

5) $\frac{1}{2}$; $\frac{1}{5}$; $\frac{2}{3}$; $\frac{3}{4}$; $\frac{1}{10}$; $\frac{1}{4}$; $\frac{1}{3}$; $66\frac{2}{3}$%; 75%; 10%; 50%; 20%; $33\frac{1}{3}$%; 25%

6) 12; 3.70; $60; $30; 3.90; $200; $15; $34; $900 7) 73; 2; 913

8) 8; 150; $200; 7; 12; 10

9) .5, 50%; $\frac{13}{100}$, 13%; $\frac{21}{50}$, .42; $.33\frac{1}{3}$, $33\frac{1}{3}$%; $\frac{3}{4}$, 75%; $\frac{1}{5}$, .20

10) 43 11) $2,400 12) $71.20 13) $2280 14) $.60; $.15; $.20

15) ⑨⑦ (123) ⑨⑤ 16) 33% 17) 176 18) $950.00 19) 26%

20) 6.40 oz. 21) $64,000 22) $390.37 23) 22 24) $448

25) 1,120,750 26) $490; $1960 27) 16.80

ASSIGNMENT 29

1) 16,051 2) 8 3) 13.106 4) 10,527 5) $8\frac{5}{8}$ 6) 5.168

7) $\frac{5}{8}$; $\frac{3}{8}$; $\frac{3}{4}$ 8) 646,801 9) 546.921 10) 49R22 11) 705R8

12) 1986; 26(from 1960) 13) $80.00 14) $2.00 15) $18.75

16) 18,728 17) $238.80 18) $34.00 19) 269,382 20) $9\frac{4}{5}$ 21) 3

22) 30.872 23) .55 24) .03 25) $1\frac{2}{3}$ 26) $2\frac{2}{3}$ 27) 14.6 28) .4

29) .15; .74; .02; .09 30) 25%, 3%; 27%; 2%; 99%

31) $15.00; $78.75; $21.00; $18.00 32) 225 33) 2¢ 34) $\frac{1}{3}$ yd.

35) 3% 36) 4 37) $8\frac{1}{8}$ 38) $5\frac{1}{8}$ 39) $8\frac{1}{3}$ 40) 8,530

41)

		$\frac{5}{16}$
$\frac{1}{4}$		
	$\frac{3}{8}$	

4.2		5.0
	5.4	

ASSIGNMENT 29 (Continued)

42) 23,600 43) 2,470 44) 50¢; 60¢; 80¢ 45) 25,727,044

46) 564,642 sq. mi.; 365,000; yes; yes 47) $2,640 48) $\frac{9}{12}$; $\frac{18}{24}$, $\frac{15}{20}$, $\frac{24}{32}$,

49) 3,300 50) 21

ASSIGNMENT 30

1) (b) $171 (c) $229 (c) $124 (e) $355 2) Charles Levin; Charles Levin; As earnings rise income taxes increase 3) (a) Household operation (b) Transportation (c) Recreation and education (d) Medical and personal expenses (e) Medical and personal expenses (f) Housing (g) Clothing (h) Savings 4) 33%; 15% 5) 26%; 12%; 3% 6) 6%; 7% 7) Transportation 8) Income is low and no money is left for savings. 9) 100% 10) Because each represents the total amount 11) (a) True (b) False (c) False (d) False 12) Clothing, $396; Transportation, $540; Medical and personal expense, $288; Recreation and education, $216; Savings, $0; Total 100%; Total amount, $3,600. 13) Food, $1519; Clothing, $588; Transportation, 15%, $735; Medical and personal expense, 7%; $343; Recreation and education, 6%, $294; Savings, 3%, $147

14)

	(a) $5460		(b) $3340		(c) $5995	
Item	%	Amount	%	Amount	%	Amount
Housing	25%	$1365	27%	$ 901.80	25%	$1498.75
Food	29%	$1583.40	33%	$1102.20	29%	$1738.55
Clothing	13%	$ 709.80	11%	$ 367.40	13%	$ 779.35
Medical	6%	$ 327.60	8%	$ 267.20	6%	$ 359.70
Transp.	15%	$ 819	15%	$ 501.00	15%	$ 899.25
Recreation	7%	$ 382.20	6%	$ 200.40	7%	$ 419.65
Savings	5%	$ 273	-		5%	$ 299.75

15) Clothing 16) Police Officer; Artist

ASSIGNMENT 31

1) $30 2) $125 3) (a) $54 (b) $32 (c) $168 (d) $81 (e) $185.50 (f) $170 (g) $340 (h) $182 4) (a) $846 (b) $768 (c) $2,232 (d) $1,269 (e) $2,464.50 (f) $3,230 (g) $8,160 (h) $3,458 5) (a) $67.50 (b) $84 (c) $190 (d) $5 (e) $30 (f) $30 (g) $72 6) $5.05 7) $8.45 8) (a) $24.70 (b) $36.86 (c) $34.70 (d) $9.25 (e) $8.45 (f) $29.70 (g) $18.50 (h) $16.70 (i) $90.15

9)

Amount Borrowed	6 Payments	12 Payments	15 Payments	18 Payments
$ 50	$ 5.50	$10.60	-	-
$100	$11.00	$21.20	$26.75	$32.30
$200	$21.16	$40.60	$50.50	$52.00
$300	$29.52	$56.40	$70.50	$84.30
$500	$40.90	$78.40	$97.75	$124.60

(a) $500 - 18 payments

(b) $50 - 6 payments

10) (a) Bank, $6.32; Credit Union, $9.80; Loan company, $17.00 (b) Loan company; Bank 13) $20 14) $7.55 15) (a) $4.18 (b) $2.84 (c) $24.73 (d) $26.41 (e) $14.05 16) $10 17) $24.05 18) $15 19) $14.05 20) Because they cannot afford to pay the entire amount at one time 21) (b) $14.05 (c) $5 (d) $21 (e) $7 22) Interest on the money still owed on the furniture 23) $2.70 25) 24 26) (a) $620 (b) $745 (c) $498

ASSIGNMENT 31 (continued)

(d) $586 27) Because you are actually borrowing money 29) So the loan company can check your credit rating 30) $30

ASSIGNMENT 32

1) Because they are a bigger risk 2) Air travel is much safer now. 3) So that fewer people will die of that disease 4) Construction worker; stunt flyer; window washer 5) Father; He should provide for his family in the event of his death 6) Premiums 7) To determine whether the person is well enough to get the insurance 8) (a) True (b) False (c) True (d) False
9) (a) $21 78 (b) $1,000 (c) until he dies 10) (a) $34.26 (b) 20
(c) 45 years (d) no 11) (a) $51.44 (b) 40 years (c) $1,000 (d) No
12) (a) $25.85 (b) $1,000 (c) Nothing (d) No 13) (a) $33.57 (b) $7.77
(c) $52.15 (d) $28.67 (e) $48.08 (f) $51.70 14) $21.34 15) $25.97
16) $33.97 17) (a) 3 (b) 7 (c) 15 (d) 23 (e) 2 (f) 97 18) $65.34
19) $274.08 20) $89.80 21) $274.55 22) $205.76 23) (a) $87.12
(b) $521.50 (c) $226.25 24) (a) $342.12 (b) $102.48 (c) $79.92 (d) $310.20
(e) $114.12 (f) $226.26 25) $161.10 26) (a) $167.85 (b) $226.25
(c) $274.55 (d) $66.60 (e) 10-year term; 20-year endowment 27) (a) premiums
(b) risks (c) protection (d) savings (e) ordinary or straight life
(f) application 28) (a) F (b) T (c) F (d) T (e) F (f) T (g) T (h) F
(i) T 29) Because at age 20 you pay for a longer period of time 30) No
31) Ordinary or straight life, 20-payment life, 20-year endowment, and 10-year term 32) Up 33) Premium

ASSIGNMENT 33

1) 23,126 2) $12\frac{1}{3}$ 3) $17\frac{1}{12}$ 4) 65.141 5) 5,712 6) 7.89 7) $5\frac{2}{3}$

8) $5\frac{5}{6}$ 9) 12,410 10) 5,493.6 11) 5,016 12) 21,336 13) 7r18 14) 2.97+

15) 17.50 16) 23.21- 17) 2.5 18) 8.9 19) (a) $87.50 (b) $95.20 (c) $87

(d) $92.50 (e) $87.50; $109.50; $117; $54.60 20) $197\frac{1}{2}$ 21) 3,000 22) $\frac{12}{100}$

.12, 12%; $\frac{86}{100}$, .86, 86% 23) $1\frac{1}{8}$ 24) $3\frac{1}{2}$ 25) $4\frac{5}{6}$ 26) 9 27) $7\frac{7}{8}$

28) $\frac{2}{5}$ 29) $1\frac{1}{5}$ 30) $1\frac{3}{4}$ 31) $\frac{4}{5}$ 32) 14 33) 2 34) $4\frac{7}{10}$ 35) $1\frac{3}{4}$

36) $1.70 37) $5\frac{3}{4}$ 38) (a) 1528 (b) 30,069 (c) $448.80 (d) 6r7 39) (a) 1628

(b) 30,069 (c) $4488.00 (d) 60r7 40) (a) 26 feet (b) 181 feet (c) 2

(d) 99 feet 41) $14\frac{3}{4}$ hours 42) $1,350 43) (a) .75 (b) .17 (c) .08 (d) .05

(e) .99 (f) .01 (g) .60 (h) .25 (i) .70 44) (a) 32 (b) $3 (c) 34.56
(d) $3.00 (e) 55.50 (f) $.90 45) (a) 3,582,400 (b) $2,000 46) $640.00
47) $780 48) $1138.67 49) $181.19 50) $422.01 51) 2.878+ 52) 547
53) 340 54) 28+ 55) .083

ASSIGNMENT 34

1) $40.88 2) $71.45 3) $68.13 4) (a) $50.12 (b) $60.29 (c) $42.31

ASSIGNMENT 34 (Continued)

(d) $64.04 (e) $54.30 (f) $71.45

5) and 6)

INTEREST PAID ON NEW CAR LOANS

Amount of Loan	21 Monthly Payments	24 Monthly Payments
$ 500	$ 39.49	$ 45.04
$ 700	$ 55.16	$ 63.20
$ 900	$ 71.0[illegible]	$ 81.12
$1000	$ 78.77	$ 92.48
$1500	$118.26	$135.12

INTEREST PAID ON USED CAR LOANS

Amount of Loan	15 Monthly Payments	18 Monthly Payments
$ 300	$25.05	$29.76
$ 400	$31.70	$37.76
$ 700	$51.80	$61.58
$ 900	$65.10	$77.40
$1000	$71.75	$85.22

7) (a) $13.47 (b) $6.06 8) (a) 36; 3 (b) $110.94; $73.81 (c) $657.16; $993.84

ASSIGNMENT 35

1) Liability 2) Collision 3) Liability 4) Liability 5) Comprehensive 6) $62 7) (a) Up to $50,000 will be paid if one person is killed or injured and up to $100,000 will be paid if two or more persons are killed or injured. (b) $91; $30 (c) $16; $26 (d) Rates decrease; there are fewer accidents (e) Large city, $143.50; small town, $82.50; little village, $52.50 8) (a) $600 (b) $1350 (c) $825 (d) $300 (e) $100 (f) $1 (g) 0 (h) 0 9) $52 10) $26 11) Teen-age girls have fewer accidents 12) $99 13) $82 14) $191 15) $19 16) (a) $236 (b) $44 17) Decrease 18) Decrease 19) $75; no 20) 128; 263 21) 46 feet 22) 63 feet

23) $7\frac{9}{17}$; $11\frac{3}{17}$ 24) $15\frac{8}{17}$; yes 25) 4; 96; 672 26) 4,871

ASSIGNMENT 36

1) 4,259 2) $1\frac{13}{18}$ 3) $25\frac{2}{3}$ 4) 29,875 5) $3\frac{7}{9}$ 6) $5\frac{3}{4}$ 7) $55.19

8) $3\frac{23}{24}$ 9) $4\frac{3}{4}$ 10) 68,310 11) 5,520.24 12) 616 13) 374 14) .457

15) 4.75 16) 3.69 17) 80 18) 4 19) $4\frac{1}{2}$ 20) $8\frac{5}{6}$ 21) $1\frac{5}{12}$

22) $2\frac{5}{6}$ 23) $11 24) $120 25) (a) Pacific (b) 31,970,900 square miles

(c) twice 26) 2,925 lb. 27) 13 28) about $9.52 29) $125.10

30) $3,000; $15,000 31) 519 32) 3,376 33) 375,200 34) 603r50

35) 900 36) .28 37) $28\frac{1}{2}$ 38) $26\frac{7}{10}$ 39) 135 40) $11\frac{1}{4}$ 41) $1\frac{9}{16}$

42) 15.60 43) $13\frac{7}{8}$ 44) $5\frac{3}{4}$ 45) $4\frac{1}{4}$ (continued next page)

46) (a) 6.547 (b) 5.29 (c) 3.871 47) .56 48) \$.09 49) \$.04

50) 250 51) (a) 12% (b) 75% (c) 30% (d) 2% (e) 6% (f) 1% (g) 99%

(h) 9% 52) (a) 5.53 (b) 29.61 (c) .595 53) \$1.65 54) $\frac{9}{12}$, $\frac{3}{4}$

55) $\frac{12}{9}$, $1\frac{1}{3}$ 56) 40¢ 57) 3,000 mi. 58) 72,000 59) 41,996,000

60) 150 61) \$4.74; \$5.26 62) .015 in. 63) \$1,458.12 64) 1,945

65) 587,650 66) 44 67) 70r19 68) 45r20 69) 58r12 70) $15\frac{1}{2}$

71) $11\frac{1}{8}$ 72) $4\frac{2}{5}$ 73) 2 74) .007 75) 22.2 76) 5.68 77) .9

78) (a) 15.50 (b) 22.88 (c) 57.96 (d) 141.57 79) (a) 6; 5 (b) smaller

(c) multiply, divide 80) 40 81) 61 82) \$22 83) (a) jet; train

(b) 28.5 sec. per mi. (c) 12 sec. per mi. 84) (a) 23¢ (b) 21¢

(c) almost 85) 927.38 86) 407,263 87) 453,600 88) 8r44

89) 606r39 90) (a) 55 feet (b) $857\frac{1}{7}$ 91) \$76.25 92) (a) Air conditioner; television (b) 6¢ (c) 9¢ (d) 54¢ 93) 40 94) 26r51

95) .02 96) $29\frac{11}{24}$ 97) $5\frac{1}{4}$ 98) $12\frac{3}{8}$ 99) $\frac{5}{64}$ 100) \$56.91

101) .3604 102) 1.6 103) .8 104) (a) .01 (b) .98 (c) .16

105) 4.86 106) 89.18 107) 6.43 108) 6,907 109) 75 110) 59

ASSIGNMENT 37

1) (a) degrees (b) pounds (c) years (d) minutes (e) feet and inches (f) quarts, gallons (g) yards (h) minutes (i) quarts or gallons

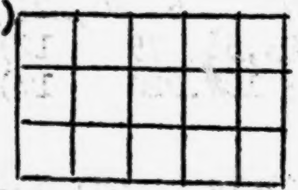
ASSIGNMENT 38

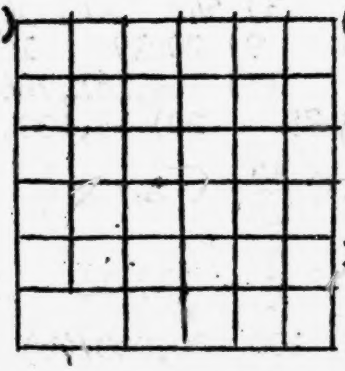
4) (a) 4 (b) 6 (c) 84 (d) 45 (e) 5 (f) 21, 120 (g) 4 (h) 8 (i) 33 (j) 252
5) (c) 71 (d) 12 feet, 2 in. (e) 5 ft. 8 in. (f) 41 ft. (g) 6 yards, 1 foot
(h) 5 feet, 7 inches 6) (a) 3 feet (b) 7 feet (c) 8 inches (d) 6 yards
7) 57 8) 62 10) 30 11) 2 12) 660 13) (a) 880 (b) 528 (c) $754\frac{2}{7}$
14) 27+ 16) (a) less (b) less (c) more 17) 300 18) 636 19) 3 yards
by 4 yards 20) 660 21) No 22) b 23) (a) 2 (b) 3 (c) 5 (d) 2
(e) 5,280 (f) 21,120

ASSIGNMENT 39

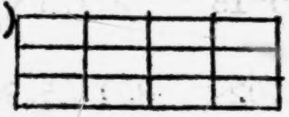
1) (a) 720 (b) 2,016 (c) 4 (d) 9 (e) 3 (f) 6 (g) 99 (h) 153 2) \$138
3) \$32 4) (a) 6 (b) \$1.68

ASSIGNMENT 39 (continued)

5) (a)

(c) 15

6) (a)

(c) 36

7) (a) 12
(b) 8
(c) $12.48

8) (a)

(b) 12
(c) $107.40

9) $195.00
10) 36

ASSIGNMENT 40

1) (a) 18 (b) 4 (c) 8 (d) 40 (e) 5 (f) 16 (g) 12 (h) 9 (i) 10 (j) 4
2) 75 3) 72 4) 2,700; 10,800 5) 200 6) 8,000

ASSIGNMENT 41

1) 240 2) 300 3) 3 4) 3 5) 180 6) 360 7) 72 8) 4 9) 6
10) 48 11) 15 12) ½ 13) 45 14) ¼ 15) 20 16) $\frac{3}{4}$ 31) ten minutes after three; three ten 32) twenty minutes after eight; 8:20
33) forty minutes after eleven; twenty minutes to twelve 38) (a) 4:00 (b) 6:10 (c) 4:05 (d) 9:30 (e) 8:30 (f) 3:15 (g) 2:40 (h) 6:50 (i) 5:35 39) (a) 20; 8 (b) 2; 10 (c) 45; 3 (d) 58; 9 40) 45 41) 320 42) 7½ hours 43) 35¢
44) ½ 45) noon 46) 135 47) 2; 120 48) 10:05 A.M. 49) 5¼ hours
50) 3¼ hours 51) 4 52) 3 53) 12 miles 54) morning 55) afternoon and evening 56) 3 57) 4 58) (a) 9:10 A.M. (b) 9:25 P.M. (c) 3:50 P.M. (d) 1:25 P.M. (e) 7:20 P.M. (f) 11:00 A.M. (g) 5:45 A.M. (h) 9:10 A.M.
59) (a) 6 (b) 156 (c) 4 (d) 1,460 (e) 112 (f) 4 (g) 4 (h) 2 (i) 84
60) (a) April, June, September, November (b) January, March, May, July, August, October, December (c) 3 (d) 92 61) Thirty days hath September, April, June and November. All the rest have 31 except February which has 28 (except when leap year comes and brings it one day more). 62) (a) September and December (b) October (c) December (d) Monday, Friday, Sunday 64) (a) Yes (b) Yes (c) No (d) Yes (e) Yes (f) No (g) No (h) No 65) Every four years
66) (a) 12/25/60 (b) 2/16/54 (c) 7/8/65 (d) 11/30/01 (e) 8/6/12 (f) 1/13/99

ASSIGNMENT 42

1) 15 2) 6,000 3) 4 4) 64 5) 2 oz. 6) 28 7) 22 8) 2,200
9) 8 10) $.55 11) 21 12) 1; 4 13) 12 ounces of potato chips
14) (a) Truck load of steel (d) No 15) (a) 9 ounces (b) 3 pounds (c) ½ pound (d) 17 ounces

ASSIGNMENT 43

1) (a) 60 (b) 3,600 (c) 28,800 (d) 144,000 (e) 1,008,000 2) (a) 3,600 (b) 86,400 (c) 1,036,800 3) No – only $934,000 4) Yes – $1,053,000
5) No – only $312,000 6) (a) $192,000 (b) $312,000 (c) $1,003,200 (d) 226 yr.
8) 164 yr. 9) 49,304,000 10) (a) 1,100,000 (b) 600,000 (c) 1,300,000
11) 1000 x 12 = 12,000; 12,000 ÷ 365 = 32 r 320 or 32 years and 320 days
12) 15 ft. 13) 593 m.p.h. 14) 26½ hr. 15) 3,000 16) 11 17) 14,200
18) (a) Mach 1 (b) Mach 1 (c) Mach 2 (d) Mach 2

ASSIGNMENT 44

1) \$12.47 2) 98,856 3) 548 4) 36,042 5) 11,692 6) 80,127
7) 174,000 8) 26 r 25 9) 20r19 10) 298r3 11) \$3,564.75 12) \$4,800;
\$180 13) 12 14) 8 15) 164,161,786 16) 653,058; 107,620 17) 225
18) 3,500,000 19) \$48.75 20) \$5,400; \$12,600

21) $\frac{7}{16}$ 22) $7\frac{1}{24}$ 23) $\frac{13}{18}$ 24) $3\frac{1}{3}$ 25) $4\frac{5}{12}$ 26) 18 27) $8\frac{3}{4}$

28) $1\frac{6}{7}$ 29) 16 30) $2\frac{3}{4}$ 31) $1\frac{1}{4}$ 32) $5\frac{1}{2}$ 33) \$7.02 34) \$5.90 35) 36

36) \$13,007.20 37) (a) 100,800,000 (b) Yes 38) $3\frac{1}{2}$ 39) .2 second; left
handed hitter is closer to first base 40) \$87.04 41) 314.42 42) \$38.65
43) \$144.22 44) .4530 45) .0609 46) .04 47) .014 48) 53.3+
49) 2.9+ 50) 554.4 mi. 51) 326,488 52) \$5.50 per yr. 53) \$.60

54) (a) $13\frac{10}{13}$ (b) 8 (c) $\frac{10}{13}$ (d) 5 (e) .1 (f) 18 (g) 2 (h) 10 or 11 (i) 9 or 13

(j) $\frac{11}{9}$ (k) 4 (l) .1 55) $\frac{5}{8}$ 56) (a) Detroit-collected more money; (b) about
\$4,316 (c) about \$2,746; (d) about \$1,570 57) (a) No; (b) Yes; (c) Yes;
(d) No 58) (a) 3,276; (b) 1,984 (c) 3,248 (d) 2,109 59) (a) \$4.95 (b) \$5.67
(c) \$6.33 (d) \$7.10 60) (a) .15 (b) .74 (c) .02 (d) .99 (e) .01 61) (a) 25%
(b) 95% (c) 3% (d) 9% (e) 15%

62) (a) $\frac{11}{20}$ (b) $\frac{4}{5}$ (c) $\frac{3}{50}$ (d) $\frac{1}{100}$ 63) (a) 25% (b) 30% (c) 14% (d) 40%
64) (a) \$88 (b) 12.06 (c) 118.80 (d) .84 (e) 189.75 (f) 5.88 65) (a) $\frac{1}{4}$; .25
(b) $\frac{3}{5}$; .60 (c) $\frac{19}{20}$; .95 (d) $\frac{1}{5}$; .20 66) 43 67) \$45.80; \$183.20 68) \$2,048;
\$170+ 69) (a) 4¢ (b) 8¢ (c) 5¢ (d) 1¢ (e) 3¢ (f) 7¢ (g) 6¢ (h) nothing
70) .32+ mi. 71) \$649; \$1,298 72) (a) \$28.75 (b) \$57.50 (c) \$143.75
73) 3,000 74) 200 75) 13 76) \$99.00 77) (a) 100% (b) time (c) television
sets (d) yes (e) automobiles 78) 11,159 79) 56,000 80) 37,185
81) 1,904,301 82) 82r29 83) 6 84) \$19,301.97

85) $8\frac{3}{8}$ 86) $5\frac{5}{8}$ 87) $1\frac{3}{4}$ 88) $2\frac{1}{2}$ 89) \$489.49 90) .01248 91) 25
92) .2 93) 50 94) 21 95) (a) .49 (b) .98 (c) .03 (d) .72 (e) .04
96) 4 97) 2 98) 2 99) 52 100) 2